



Essays on Federal Reserve Bank Evolution, Transparency and Market Interaction

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Essays on Federal Reserve Bank Evolution, Transparency and Market Interaction

A dissertation presented

By

Evan A. Schnidman

to

The Department of Government

in partial fulfillment of the requirements

for the degree of

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in the subject of

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Essays on Federal Reserve Bank Evolution, Transparency and Market Interaction

ABSTRACT

This three part dissertation begins by “Examining the Origin of Federal Reserve Independence.” This paper explores early Fed history with a particular emphasis on the period between 1947 and 1953 in order to provide a complete political account of Fed Independence.

Part two continues by exploring “Centralization and Technocracy at the Federal Reserve.” This paper examines the centralization of Federal Reserve power at the Board of Governors in Washington DC and the origins of modern technocratic policymaking at the Fed. Archival evidence identifies the origin of increasing Fed technocracy as an internal Fed program originating in 1963. Evidence suggests that steps toward increasing Fed technocracy largely stalled in the 1970s and resumed in 1979 continuing through the 1980s into the 1990s and 2000s. The story of Fed centralization and technocracy presented here demonstrates the growth and change of a government bureaucracy largely without statutory mandate, and highlights the methods bureaucracies use to limit external political pressure.

With transparency identified as a key means by which the Fed has maintained its independence, the third component of the dissertation examines “How the Fed Moves Markets: Equity and Bond Market Reactions to Federal Reserve Communications.” This paper explores the financial market effects of increased Fed transparency by examining each type of Fed communication to see how these communiqués influence market behavior. Findings indicate that market volatility is little changed as a result of most of these Fed communications. This suggests that despite media hype, investors draw minimal useful information from most individual Fed

communications and largely treat these communiques as noise or “cheap talk.” These findings provide insights on how bureaucracies utilize communication and transparency measures to control the flow of information about policymaking at their institution. These findings also lead to an alternative means of analyzing Fed communications involving quantitative analysis of the content of all Fed communications in concert, rather than qualitative analysis of individual communications. This alternative analysis identifies the broad signals provided by modern Fed transparency measures and clarifies how this quantitative approach to qualitative communications might be useful in gauging market response to current and future transparency measures.

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Examining the Origin of Federal Reserve Independence

ABSTRACT

Economic history research on the Federal Reserve typically emphasizes the role of the 1951 Fed-Treasury Accord in establishing modern Fed independence. This paper provides a more complete examination of early Fed history and the ultimate evolution of Fed independence with a particular emphasis on the period between 1947 and 1953. This account demonstrates that although the 1951 Accord played a large role in eventual Fed independence, it was only one in a series of political events that culminated in an independent Federal Reserve. Most notably, these events include the 1948 election of Senator Paul Douglas and the subsequent Douglas Hearings, the 1950 and 1951 instances of Treasury and White House press deception, the 1951 Fed-Treasury Accord and appointment of William McChesney Martin as Fed Chairman, the 1952 election of Dwight Eisenhower and the beginning of the Eisenhower administration in 1953. Since the Korean War helped drive the election of President Eisenhower, the war also plays an important role in a political examination of Fed independence. Some discussion of how independence leads to Fed centralization and policy transparency is also provided.

1. The Evolution of the Fed

Almost 100 years after its founding, the legality of the U.S. Federal Reserve's existence is still questioned by some,¹ while many Americans view it as a part of government like any other. In theory, the Fed is an institution designed to conduct monetary policy and regulate financial markets as it has done for the last 99 years. That is much like saying it is the job of Congress to make laws, the Executive branch to enforce them, and the Courts to interpret them.

Political scientists have spent decades examining the inner workings and evolution of powers exercised by Congress, the Presidency, the Bureaucracy and the Courts, but the Fed has received far less attention. Moreover, any study of the modern Fed is incomplete without a thorough examination of the history of the institution. In the last 99 years the Fed has evolved from a system designed to aggregate disparate regional economic preferences to one that serves as a centralized system of information aggregation. Policy has evolved from being made by pluralist preference synthesis to a complex technocratic process of information centralization. Although it is technically the same institution, with many of the same structural features, the modern Fed is a very different place than it was intended to be in 1913, and the foundation for modernization began in the late 1940s.

In its infancy, the Fed sought to aggregate economic preferences from each of the 12 regional Federal Reserve banks. In theory, this would allow for policy to be made that satisfied the regional business interests in diverse parts of the country. Some might even deem this early process as a democratic or representative means of making monetary policy. The combination of missteps in policy-coordination, and the very fact that the Fed was designed to be an agent of the

¹ Most notably, Congressman Ron Paul (R-TX) has been a vocal critic of the Fed on legal and economic grounds.

government, led to centralization. This early centralization began a pattern of independent change by the Fed, without the express legal consent of its principals in the Legislative and Executive branches.

The Fed's diverse principals in the Legislative and Executive branches were intended to constrain the Fed to act on behalf of their constituents, the American people. Fundamentally, this is because the public is actually the Fed's principals, but they are represented by their elected proxies in Congress and the White House (as well as executive agency appointees). Not surprisingly, these elected representatives have frequently been at odds with one another about Fed policy, creating a "common agency problem" whereby the Fed is unable to satisfy multiple principals with competing interests (Dixit and Jenson, 2003).² Ultimately, in an effort to minimize pressure from their principals, the Fed centralized power and became increasingly technocratic and beholden to expertise and information more than democratically elected political principals.

In examining how the Fed shifted from a dispersed, pluralist, preference-aggregation system to a centralized one that emphasizes technocratic aggregation of information, it is crucial to explore the Fed systematically with an eye toward political pressures. A case could be made for examining the role of each regional Federal Reserve Bank, but this strategy is impractical given that some regions had a far more dramatic impact on the system as a whole than others.³ The more precise mechanism explored here is a chronological one that acknowledges the importance of different Fed chairmen and various economic crises. Therefore, this paper

² Dixit, Avinash, and Jensen Henrik . "Common Agency with Rational Expectations: Theory and Application to a Monetary Union." *The Economic Journal* . no. 489 (2003): pp. 539-549.

³ Certain banks have a long history of hawkish dissent (Minneapolis) or monetarist thinking (St. Louis) while others have been known for their close ties to the banking industry (New York).

explores the Fed through a series of eras with particular emphasis on the period between 1947 and 1953 when the Fed most acutely asserted its independence.⁴ The 1907 financial panic and the impetus for the Fed are briefly explored before examining the early years of the Fed from 1913 to 1933 when the Fed began its pattern of centralization and internal reform without legal grounding. Then the modernization of the New Deal and World War II is examined in the period from 1933-1946 when the relatively weak Fed underwent a series of statutory reforms dictated by its principals. The bulk of this paper examines the period from 1947-1953 surrounding the Fed-Treasury Accord of 1951 that is commonly used as a benchmark for the origin of Fed independence. Although 1951 is regularly cited as a cut-point where the Fed asserted its independence from the Treasury and, to a lesser extent, Congress, the analysis provided here demonstrates that this was actually accomplished through a series of political, economic and international relations events over several years.

Moving forward, section two examines the founding and early history of the pluralist Fed through its evolution during the Depression and World War II era. Section three examines the period from 1947-1953 with an emphasis on the political steps involved in the Fed gaining its independence. Section four concludes with some comments about how political conditions allowed the Fed to evolve by utilizing its first mover advantage as an autonomous bureaucracy seeking to control its own reforms despite inflexible legal and legislative boundaries.

⁴ See Appendix 1 for a timeline of major Fed policy and reform throughout the different eras

2. The Early Fed

2.1 The Aldrich Plan and the Federal Reserve Act

In order to examine the early pluralist history of the Fed, it is essential to begin at its founding. After the failure to re-charter the First and Second Banks of the U.S., the country faced the “Free Bank Era” from 1837-1862 followed by a series of nationally chartered private banks in the period from 1863-1913. These eras were riddled with financial panics and crises which occurred roughly once each decade. In his examination of post-Civil War reconstruction titled *Yankee Leviathan*, Richard Benseel attributes these financial panics largely to dysfunction at the U.S. Treasury. In particular, Benseel argues that the rise of finance and capitalists in a single party system in the north bred clientelism and corruption that was sustained by political appointees who were preoccupied with finance and dogmatically against state intervention in the economy. These Treasury positions limited “radical reconstruction” efforts (such as wealth redistribution), and pushed the U.S. economy back on the gold standard in an effort to resume international trade. Benseel asserts that these efforts to satisfy finance interests not only limited reconstruction efforts, but also fueled the banking panics that culminated in the panic of 1907 and the ensuing financial crisis (Benseel 1990).⁵

The result of the 1907 panic was that John Pierpont Morgan and several other wealthy investors had no choice but to step in and provide the necessary liquidity to mitigate the crisis. The power of these few wealthy investors coupled with the severity of the crisis prompted Congress to take action (Brunner and Carr, 2007).⁶ Senate Majority Leader Nelson Aldrich (R-

⁵ Benseel, Richard. *Yankee Leviathan: The Origins of State Authority in America*. Cambridge: Cambridge University Press, 1990

⁶ Bruner, Robert and Sean Carr. *The Panic of 1907: Lessons Learned from the Market's Perfect Storm*. Hoboken, New Jersey: John Wiley and Sons, 2007.

RI) formed a bipartisan National Monetary Commission to study the American monetary system and examine the various different European central banks. Although he initially supported a government-issued bond system, upon examining the European central banks (particularly the German Bundesbank and the Bank of England), Aldrich changed his views and began crafting a plan to create a United States central bank (Law Librarians Society).⁷

As written in 1910, the Aldrich Plan called for a central bank with a Washington D.C. headquarters and fifteen branches throughout the U.S. in geographically strategic locations. The bank would help manage a uniform elastic currency based on a combination of gold and commercial paper. While Aldrich preferred a central banking system with no political involvement,⁸ he decided that a bank with no public control was not politically feasible. His solution was a proposal involving representation of the public sector on the Board of Directors. This compromise did not satisfy his critics, particularly southern Democrats and Populist factions, who feared Aldrich was swayed by his close ties to the banking industry. In contrast to Aldrich's proposal, progressive Democrats favored a reserve system owned and operated by the government; they believed that public ownership of the central bank would end Wall Street's control of the American currency supply. In something of a compromise, conservative Democrats sought a privately owned, yet decentralized, reserve system, which would still be free of Wall Street's control.

The 1912 election proved to be the death knell for the Aldrich plan as Democrats swept into leadership of Congress and the White House. Ultimately, Senator Robert Owen (D-OK) proposed his own bill that differed from the Aldrich Plan in one significant way; Owen placed

⁷ Law Librarians Society

⁸ Aldrich's daughter was married to John Rockefeller Jr. and his son headed Chase National Bank so he had strong ties to private banking interests

control over the personnel selected for the Board of Directors⁹ with the government. The bill passed Congress in late 1913 on a mostly partisan basis, with most Democrats voting "yea" and most Republicans voting "nay".¹⁰

2.2 The Early Days

Government control of the Board personnel immediately established members of Congress as the primary principals of the newly established agency. Since the Fed was independent, it did not fall under the typical architecture of an executive branch agency, thus granting the White House less direct power over the new central bank. This also left Congress with more room to assert authority over the Fed. Despite Congress feeling a greater institutional responsibility for the bank, it was the executive, particularly the Department of Treasury, which came to dominate the Fed through its first 40 years. This executive branch dominance can be seen as both a result of the institutional design of the Fed and the power of a unitary executive¹¹ facing electoral and other political pressures.

The 1913 Federal Reserve Act established a need for at least eight, and no more than 12, private regional Federal Reserve banks. 12 banks were established and scholars Sarah Binder and Mark Spindel have examined the archives of the Reserve Bank Operating Committee (RBOC) to determine how these bank locations were selected. Upon the passage of the Federal Reserve Act,

⁹ The modern iteration of the Board of Directors is essentially the Federal Reserve Board of Governors, this was changed in 1935.

¹⁰ A History of Central Banking in the United States

¹¹ As opposed to Congress, the President only has one set of political objectives. Congressional pressure can pull in multiple directions, thus weakening their dominance of a bureaucratic agency.

the RBOC was commissioned by Congress and comprised of Treasury Secretary William McAdoo, Agriculture Secretary David Houston, and the incoming Comptroller of the Currency John Williams. The RBOC immediately got to work “conducting a poll of bankers in the more than seven thousand national banks that were required to join the new reserve system.” The RBOC members also “embarked on a ten-thousand-mile “listening tour” of eighteen cities to allow cities to press their case for a reserve bank (Binder and Spindel, 2013).”¹² Ultimately, 37 cities submitted formal applications to house a reserve bank and 12 were selected; Binder and Spindel assert that the selection of reserve bank locations was driven by a mixture of geographic/transportation, political and financial concerns.

Binder and Spindel’s work identifies two possible strategies the RBOC might have pursued in determining the locations of the reserve banks. Their “financial model” assumes that decisions are made for economic reasons, while their “political model” assumes that since all three members of the RBOC were close to President Wilson, Democratic politics played a role in choosing the locations. Since the results of the banker survey revealed that the financial community wanted the fewest possible regional banks in an effort centralize finance and limit coordination problems, it is clear that political or geographic concerns played a role in selecting 12 locations as opposed to 8. Binder and Spindel’s research also identifies 5 of the 12 regional bank locations as having been outside the top 12 financial hubs in the country at the time.¹³ Ultimately, their findings suggest:

...that the RBOC sought to make up for the deficit of credit in the South, and thus sought out southern locations when looking to extend the reserve system beyond the nation’s

¹² Binder, Sarah , Spindel, Mark. "Monetary Politics: Origins of the Federal Reserve." *Studies in American Political Development*. (2013): 1-13.

¹³ Minneapolis (15th), Kansas City (18th), Richmond (24th) and Atlanta (27th) all got banks even though they were ranked lower than 12th in economic activity. Plus, Dallas was not even in the top 50, so it was unranked and they got a bank.

financial centers in the East. In doing so, of course, the RBOC also placed a coveted financial resource in the heart of the Democratic South (Binder and Spindel, 2012.¹⁴

Similarly, the placement of western locations could be seen as the RBOC's view of westward expansion,¹⁵ but the clustering of banks in Democratic and Progressive strongholds and the lack of banks in the mountain west cast doubt on this apolitical story. The map provided in Figure 1 identifies the boundaries of the 12 Federal Reserve districts as they were drawn by the RBOC.



Figure 1: Federal Reserve Bank District Boundaries

¹⁴ Binder, Sarah , Spindel, Mark. "Monetary Politics: Origins of the Federal Reserve." *Studies in American Political Development*. (2013): 1-13.

¹⁵ The RBOC's attempt to predict westward expansion was unsuccessful; at present the 12th district (San Francisco Fed) represents more than 20% of the U.S. population and GDP.

2.3 Federal Reserve Representation

Figure 2 provides a graph of U.S. population breakdown by Federal Reserve Bank District in 1913. As this graph demonstrates, the boundaries of the twelve banks were not drawn equitably by population in 1913. Taken in concert with the analysis by Binder and Spindel, population, economics and geography/transportation can all be ruled out as pure strategies for determining the locations of regional bank. This is epitomized with the placement of a reserve bank in Kansas City. Despite being the country's 20th largest city and 18th largest banking center, Kansas City still made its way to being one of the 12 regional banks over bigger financial hubs in more centralized locations (relative to other regional banks) like Denver, Omaha and Lincoln. Unlike those other locations, Kansas City had a powerful Democratic political machine.¹⁶ This political sway likely played a role in placing a second Federal Reserve Bank in the state of Missouri and demonstrates that politics was involved in nearly every step of creating the Federal Reserve System.

¹⁶ Big Tom Pendergast was rising to power as a political boss in Kansas City at this time.

Federal Reserve District Population as a Percent of U.S. Resident Population 1913

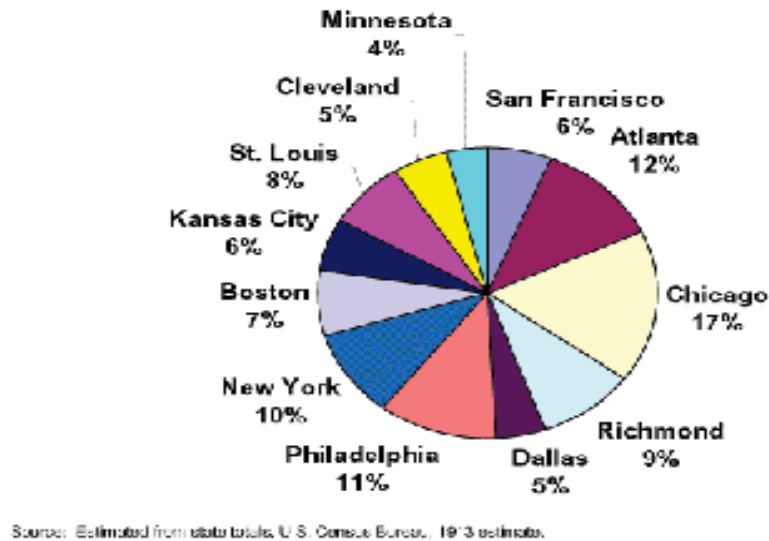


Figure 2: Fed District Populations in 1913

Figure 3 provides modern context to the regional population dynamics. Using the 2000 census data it is obvious that Minnesota, Cleveland, Kansas City, St. Louis and Boston are all significantly over-represented in the modern Fed. A simple calculation would indicate that those residents living in Minnesota Fed district are more than six times as represented as those residing in the San Francisco district. Further, the fact that the President of the New York Fed has a permanent vote on the FOMC whereas the other regional bank Presidents rotate roughly every three years means that the 7% of the population residing in the NY Fed district are nearly 7.5 times as well represented as those residing in the San Francisco district.¹⁷ This representation dynamic was even more complex in the early years of the Fed when the Board also included the

¹⁷ $17/7 = 2.7$ and the 11 regional banks presidents (aside from NY) vote hold four seats on the FOMC and $11/4 = 2.75$ so $2.7 \times 2.75 = 7.425$

Treasury Secretary and the Comptroller of Currency. Both were eliminated from the Board of Directors when it was renamed to the Federal Reserve Board of Governors in 1935 (Flaherty, 2010).¹⁸

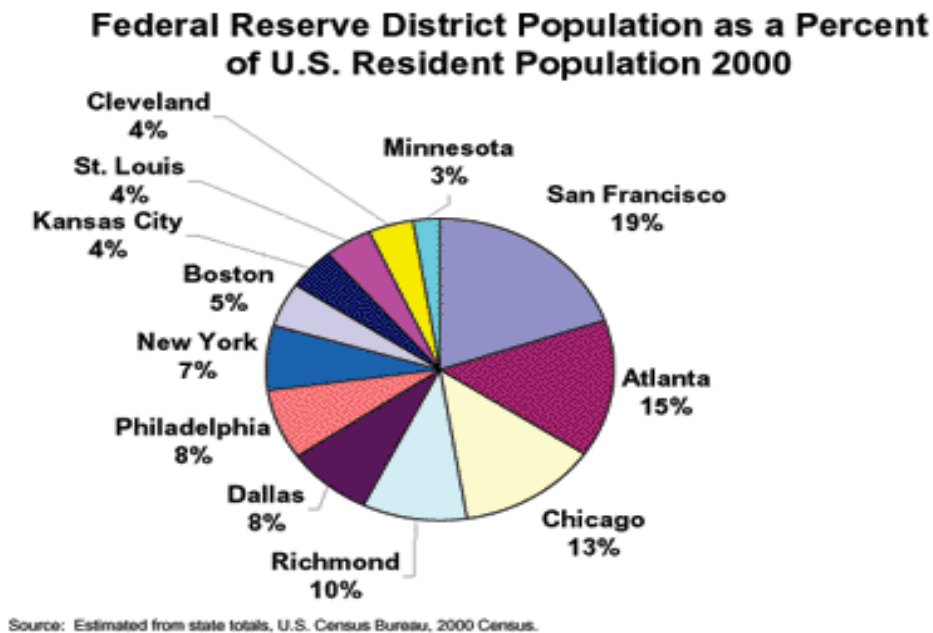


Figure 3: Fed District Populations in 2000

Aside from the representation problems caused by the district boundaries of the Fed, the central bank also created a principal-agent relationship between Congress and the Fed due to the appointment and confirmation process of personnel selection. Further, the Federal Reserve Act also established a new national currency¹⁹ and compelled all nationally chartered private banks

¹⁸ Flaherty, Edward. "A Brief History of Central Banking in the United States." Last modified 2010. Accessed July 20, 2013. <http://odur.let.rug.nl/~usa/E/usbank/bankxx.htm>

¹⁹ This was the origin of the Federal Reserve Note which denoted a government obligation to allow holders to use these notes to redeem gold held by the U.S. Treasury. This is opposed to the United States Note which the Treasury

to become members of the Federal Reserve System. These private banks were now required to purchase specified non-transferable stock in their regional Federal Reserve bank, and to set aside a stipulated amount of non-interest bearing reserves with their respective reserve bank. State chartered banks were given the option of becoming members, but they were not compelled to do so. Many of these state banks did join the system because it had myriad benefits. In addition to being entitled to access discounted loans at the discount window in their respective reserve bank, these member banks also become a key constituency for the newly established central bank.²⁰ While members of Congress might have been the Fed's formal principals, the private sector held enormous sway over Fed policy, especially at the regional bank level.

In the early years of the Fed, from its founding until Depression-era reforms, the regional interests dominated Fed policy. Regional directors and staff were selected by the local business community to represent local business interests. Given the regional diversity of the economy and the initial weakness of the Board of Directors, regional banks were basically free to set their own rates. Not surprisingly, these differential rates at different reserve banks created arbitrage opportunities for investors and forced the regional banks to coalesce behind a singular policy.²¹ This first step toward centralization meant that the regional Federal Reserve banks began to follow the lead of the highest volume exchange bank, the Federal Reserve Bank of New York. Without prompting by the federal government, the Federal Reserve had begun to silence

was under no legal obligation to back with gold. Basically, the Federal Reserve Note was/is backed by the Fed's government debt holdings.

²⁰ The 1913 Federal Reserve Act stipulates that regional Fed banks were to select their own leadership via a complex voting mechanism involving the regional bank board members who were typically powerful businesspeople in the region.

²¹ For a brief period, smart investors could make money simply by traveling from one region to another and exchanging at different rates.

the preferences of the regional banks and create a centralized system favoring New York bankers from a system designed to be decentralized and favor more populist constituencies.

2.4 Roaring Into The Depression

By the time the roaring 20's began to slow in 1927, the New York Fed had functionally become the central decision-maker for the entire system. So, when New York Fed Governor Benjamin Strong decided to lower interest rates to sustain rapid growth, the entire system followed suit. Strong was undoubtedly concerned with maintaining the legitimacy of the young central bank. After all, no central bank in U.S. history had survived more than 20 years. Unfortunately, Strong either failed to see the 1927 recession as a natural market correction, or he was heavily swayed by the Wall Street banking interests that dominated the New York Fed. Regardless, the economy over-heated and the stock market crashed in 1929.²²

Strong died shortly after the 1927 slowdown and was an easy scapegoat for Fed officials seeking to lay blame for poor policy decisions when the Depression began. Notably, Federal Reserve Board Governor Adolph Miller publicly declared that the Fed should have let the economy cool down in 1927, and instead their actions may have overheated it. In 1930, with the stock market still reeling from the crash, a private bank with the seemingly official name, the Bank of United States, failed.²³ Still under fire for possibly making the wrong choice in 1927, the Fed had to decide whether or not to step in and save the bank; it was a classic question of whether mitigating systemic financial risk was worth the moral hazard. Moreover, it was a

²² Moss, David and Cole Bolton. The Federal Reserve and the Banking Crisis of 1931. Harvard Business School Case. January 2009.

²³ Moss, David and Cole Bolton. The Federal Reserve and the Banking Crisis of 1931. Harvard Business School Case. January 2009

question of how to satisfy Wall Street interests that were terrified of a steeper downturn while still appeasing democratically elected Congressional principals seeking to distance themselves from bankers who had lost their constituents' money.

Quickly the question of rescuing one bank became a question of changing the entire basis for our monetary structure. By the end of 1931 much of Europe, including the U.S.'s largest trade partner, Britain, had gone off the gold standard, but the Fed was bound by law to stay on gold and it would have required an act of Congress to supersede this law. Interestingly, the Fed, led by New York, never asked to go off gold and instead elected to pump liquidity into the system in the most cautious way possible, lend out at high rates and avoid moral hazard by only loaning on good collateral. In response, Congress expressed displeasure with this meek policy and asked that the Fed to consider a bolder move, loaning on all collateral. Fed personnel saw this as a populist (not a democratic) push and had no interest complying.

The leadership of the New York Fed throughout the 1920s and into the 1930s demonstrates that in fewer than 20 years, and without formal legal mandate, the Fed began its journey from a decentralized system to centralized one. These steps eventually allowed the Fed to evolve away from a decentralized attempt to appease its principals in Congress to a centralized system focused on economic data and technocratic policy ideas. It would take several more decades for this progression to come to complete fruition, but the steps taken in the Fed's first twenty years laid the groundwork for the centralized but independent Fed that began to take shape in the middle of the 20th Century.

3. The Ineffectual Fed: 1933-1946

Despite efforts to coordinate Fed policy around the New York Fed, or possibly because the New York Fed was perceived (perhaps accurately) to be beholden to Wall Street banks, as the Depression deepened it became clear that it was politically necessary to reform the American financial regulatory and monetary system. Weakened by the steep recession and the lack of action to combat the crisis, the Fed failed to move first to reform itself²⁴ and attempt to boost economic growth. Instead, Fed personnel were largely spectators watching as their principals in Congress and the White House passed New Deal measures that altered the structure of the Fed. These New Deal efforts largely focused on the regulatory roles of government institutions, but structural changes to the Fed, coupled with the Fed's diminished reputation, had lasting implications that forced the Fed to comply with Treasury's efforts to finance World War II.

3.1 The New Deal

In the face of 25 percent unemployment and a collapsing financial sector, upon taking office in 1933 Franklin Roosevelt instituted his New Deal. These programs sought to stimulate demand and provide work and relief for the impoverished through increased government spending and institutional financial reforms. The Securities Act of 1933 comprehensively regulated the securities industry and was quickly followed by the Securities Exchange Act of 1934 which created the Securities and Exchange Commission. Also in 1933, the Glass-Steagall Act created the FDIC to insure private bank deposits. The creation of the SEC alleviated some

²⁴ In recent decades the Fed has become increasingly adept at self-reform in order to avoid formal changes by Congress.

pressure on the Fed to regulate financial markets²⁵ and the FDIC provided a clear mandate that the Fed was to be a systemic lender of last resort with the new FDIC securing individual deposits.

Glass-Steagall had a dramatic effect on the Fed as a regulator, but it was not until 1935 that the monetary side of the Fed faced genuine reform, and those reforms were primarily a renaming of the Board and the elimination of the Treasury Secretary and Comptroller of Currency from Board positions. In addition to the elimination of these executive branch agents from the Fed Board, reforms dictated that all Fed Board of Governors nominees would be subject to Presidential appointment and Senate confirmation. Functionally, this meant that the structural reform to the Fed in the 1930s consolidated power in the hands of members of Congress, specifically senators.

3.2 War Financing

Shortly after the bombing of Pearl Harbor on December 7, 1941 Federal Reserve and Treasury officials convened to determine a ceiling for bond rates as the country sought to finance the war effort. The ceiling was set at 2.5% for bonds and a range of 0.5-0.75% for bills. Contrary to public perception, the Fed actually initiated the move to fix rates as a means to finance the War and the Treasury reluctantly agreed (Wicker).²⁶ This agreement laid the groundwork for a Fed-Treasury partnership that severely infringed on central bank autonomy through the rest of the decade as the Treasury pressured the Fed to maintain low interest rates.

²⁵ Although this type of regulation was more in the realm of the Office of the Comptroller of Currency

²⁶ Wicker, Elmus R. "The World War II Policy of Fixing a Pattern of Interest Rate." *The Journal of Finance*. no. 3 (1969): pp. 447-458.

During the War the Fed sought to utilize open market operations to maintain the agreed upon interest rate levels, but Treasury preferred a different method, manipulation of excess reserves. Since the Fed saw such manipulation as outside their congressionally granted mandate, they were rapidly undercut by the Treasury which unilaterally decided to peg interest rates at 0.375% for treasury bills (short-term) and 2.5% for treasury bonds (long-term) (Wicker).²⁷ With the Treasury rates pegged, the Fed had to choose between appearing unpatriotic and allowing government debt to go unsupported, or continuing to buy and sell securities to maintain the Treasury's desired rates. The Fed elected to acquiesce to Treasury's demands, thereby setting a precedent of Fed subservience to unilateral Treasury policy.

By pegging interest rates, the Treasury effectively took away the fluidity of the government securities market and rather than having control over excess reserves and control of open market operations, the securities market had to equilibrate to the set interest rates. This meant that banks had an incentive to switch their assets to long-term securities with no risk because the given rate is fixed. Since these securities were viewed as such safe assets, the banks treated treasury bonds as excess reserves on the presumption that they were as safe as cash and provided them some return. Consequently, rather than holding excess reserves, banks persisted in buying up bonds and avoiding bills. This forced the Federal Reserve to then buy up massive amounts of Treasury bills to maintain the agreed upon level of interest rates. As a result, the money supply rapidly increased (Board of Governors, 1947).²⁸

²⁷ Wicker, Elmus R. "The World War II Policy of Fixing a Pattern of Interest Rate." *The Journal of Finance*. no. 3 (1969): pp. 447-458.

²⁸ Board of Governors of the Federal Reserve System. *Annual Report Covering Operations for Year 1947*. Washington D.C.: Federal Reserve, 1947.

Fed officials quickly realized that these policies were not sustainable from a price stability perspective, but as long as the war continued, they had no choice but to continue the policy and effectively cede control of the government securities market to the Treasury. Had the interest rates been flexible, which they would have been if the Fed pursued independent policy, banks would have had an incentive to buy bills and the change in money supply and inflation would not have been so dramatic. Thus, if the Treasury had held true to their initial agreement money supply would not have grown as substantially, but Fed officials failed to assert Fed independence when Treasury undercut their policy. Moreover, once the Fed initially acquiesced to Treasury, they could not assert independence by backing out of the agreement without being branded as unpatriotic during wartime. Such a label would have provided an easy foothold for Congress and President Truman to reform the Fed by further diminishing its independence.

3.3 Post-War

As the war came to a close the low rate policy did not. At the Treasury's behest, the Fed was forced to maintain extremely low interest rates thereby following the precedent they set early in the war and continuing to cede control of the money supply to the Treasury. This meant that the total amount of monetary assets in the country was being expanded by continued low bond and bill rates, despite meek objections from Fed personnel. In 1944 the Bretton Woods agreement establishing a system of fixed but adjustable exchange rates based on a \$35 per ounce gold price made the Fed's control of monetary policy even more tenuous since they had less

direct control over the cost of money (Meltzer, 2003).²⁹ Essentially, the Fed remained subservient to the Treasury in the emerging post-war world.

Finally, in 1946 Congress began to stand up for the Fed. They passed the Employment Act which contained a vague mandate for the Fed to direct policy to achieve “maximum employment and purchasing power (Meltzer, 2003).”³⁰ This early version of the dual mandate indicated that the Fed had a different charge than the Treasury and ought to act as such. It was also a clear signal that Congress would side with the Fed as Treasury’s arguments for the pegged interest rates after the war became less compelling.

4. The Fed Becomes Independent: 1947-1953

"The Accord famously reasserted the principle of Fed independence so that monetary policy might serve exclusively to stabilize inflation and macroeconomic activity."
-Professor Marvin Goodfriend

Although the 1951 Fed-Treasury Accord is widely perceived to be the origin of modern Fed independence, the steps toward independence began several years earlier and lasted into 1953. The Employment Act of 1946 emboldened Fed officials to reassert their independence and when the consumer price index (CPI) rose 14 percent in 1947 and 8 percent in 1948, Fed officials, led by Chairman Marriner Eccles, determined that the Fed needed to have tighter control over money and credit growth. The Treasury disagreed and a fight over control of the

²⁹ Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003

³⁰ Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003

Fed between the democratically elected Congress and appointed Treasury officials ensued (Flaherty, 2010).³¹

4.1 Power Struggles in the Late 1940's

Even as inflationary pressure built and a recession loomed, the Treasury continued to argue that low interest rates were necessary to maintain confidence in government credit and to hold down the cost of government debt. Moreover, Treasury officials even claimed that controlling the money supply was not necessarily an effective means of reducing inflation. Given that “the Federal Reserve did not expect to maintain the wartime rate structure after the war, (Meltzer)”³² tensions rose between the Federal Reserve and the Treasury over the Fed's desire to establish monetary control. Marriner Eccles, who had been appointed Chairman of the Board of Governors in 1934 and bluntly argued that the Treasury had turned the Fed into an “engine of inflation,” was not reappointed by President Truman in 1948. This marks the beginning of a long line of highly politicized Fed Chairman appointments and a clear point in time when politics had a dramatic impact on the Fed.

The impact of politics on the Fed had been felt much earlier, even if it was not as obvious as replacing the Fed Chairman. This appointment action was the culmination of a series of political moves throughout a contentious period in the late 1940s. During this time, the Republican controlled Congress was persistently perceived as a Fed sympathizer throughout the Fed battle with the Truman Treasury over policy autonomy. The clash between the Fed's

³¹ Flaherty, Edward. "A Brief History of Central Banking in the United States." Last modified 2010. Accessed July 20, 2013. <http://odur.let.rug.nl/~usa/E/usbank/bankxx.htm>

³² Meltzer, Allan H., “Politics and the Fed.” *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

competing principals in the legislative and executive branches provided just enough cover for the Fed to allow the bill rate to rise in 1947. This rise yielded significant interest income to the Fed. Due to an agreement allowing them to raise the bill rate, the Fed agreed to turn over 90 percent of the revenue it generated back to the Treasury. This set a precedent whereby the Fed turned over significant interest income to the Treasury; the Fed has continued to turn over income to the Treasury ever since.

The decision to stop Treasury bill targeting was a clear step toward Fed independence but the Fed still held the responsibility for maintaining the rate of long-term bonds on the Treasury's terms. Nevertheless, when the pegged bill rate was lifted, the market was so far out of equilibrium that the changes in government purchases shifted from long to short-term securities. Thus, the Fed's decreased responsibility in the short-term market led to an increase in the long-term market. Despite this increased involvement in purchases of bonds, the Fed was able to unload \$1 billion off of their balance sheet because of the increased demand in short term securities. This move effectively reduced the financial ties between the Fed and the Treasury, but "political concerns continued to limit the Federal Reserve's ability to respond to postwar inflation (Meltzer)." ³³

Despite a budget surplus beginning in spring of 1946, Treasury continued to oppose changes to wartime interest rates, thereby stoking fears of inflation. In particular, Allan Meltzer notes that "the Federal Reserve shared the widespread concern among economists that the presence of a large, outstanding public debt limited the role of monetary policy (Meltzer)." ³⁴

³³ Meltzer, Allan H., "Politics and the Fed." *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

³⁴ Meltzer, Allan H., "Politics and the Fed." *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

Balancing this concern was also the fear that increasing interest rates could lead to deflation. Since President Truman was deeply concerned about the possibility of deflation,³⁵ Chairman Eccles decided it was not a politically appropriate time to pursue such a policy. Instead, to combat inflation, Congress and President Truman passed a bill that increased reserve requirements and in turn forced the Fed to pursue contractionary monetary policy. This effectively served as a catalyst of the recession and significantly weakened the economy.

As a result of the sudden economic downturn, the Fed was able to strike a deal with Treasury in June of 1948. The deal stated that the FOMC would direct open market operations "... with primary regard to the general business and credit situation." Since unemployment rose from 3.8 percent in 1948 to 5.9 percent in 1949, and prices actually declined by 1 percent in 1949, the Fed-Treasury agreement ended up permitting the Fed to lower interest rates in an attempt to stimulate the economy. This easing measure did not assert Fed control over monetary policy as Fed officials had hoped, and it was still unclear whether the Fed would have the flexibility to raise interest rates if the problem became one of inflation (Meltzer, 2003).³⁶

In this protracted struggle between the Fed and Treasury, Congress again came to the aid of the Fed in 1949 when newly elected Senator Paul Douglas (D-IL) held a series of hearings about interest rate policy. Douglas had been a career academic economist and his sympathies clearly sat with the Fed. Douglas was also a Democrat who found natural allies on this issue in the opposing party (although for different reasons)³⁷ thereby forging a strong bipartisan interest

³⁵ Truman often pointed to the failure of haberdashery when the possibility of deflationary policy was mentioned.

³⁶ Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003

³⁷ Douglas had academic interests in monetary policy, but many of the Republican members of his coalition were simply interested in ensuring that President Truman had less control over the Fed.

in Fed autonomy. Douglas's role in the Congressional push for Fed independence highlights how election timing is a crucial part of the political story that ultimately results in Fed independence.

In particular, the Douglas hearings examined the extent to which the Fed's efforts at price stability were weakened by the constraint to buy and sell securities at the Treasury's desired rates in order to prevent yields from rising. The report stated:

Do Federal Reserve officials determine the general level of interest rates, including yields on Governments, that they will establish so that the Treasury in fixing rates on new issues must conform to the decisions of the Federal Reserve? Or do Federal Reserve officials conform their general credit policies, including their support levels for Governments, to the pattern desired by the Treasury? The evidence presented to the subcommittee indicates that there is no simple answer to these questions. Federal Reserve and Treasury officials and staff members are in frequent consultation, and many decisions are agreed upon by the two agencies without marked differences of opinion. On some occasions when there were originally differences of opinion the Treasury has "gone along" with Federal Reserve requests for higher interest rates. But the evidence indicates that in a majority of the cases where the judgments of the two agencies differed it was the judgment of the Treasury that prevailed; the Federal Reserve was not willing to assert its independence and force market yields to rise above the yields that the Treasury wished to set on its new issues, thereby embarrassing the Treasury. It appears that in the absence of strong Treasury influence the Federal Reserve would have initiated a tighter monetary policy somewhat earlier and that this policy would have been carried further. (Money, Credit and Fiscal Properties, 28-29)³⁸

Essentially, the hearing report indicates that the Fed would have engaged in tighter monetary policy, had it not been for Treasury pressure. The hearing report also stated that "the primary power and responsibility, and cost of credit in general shall be vested in the duly constituted authorities of the Federal Reserve System (Meltzer, 2003)."³⁹

The Report concluded that the benefits of avoiding inflation were great enough to justify giving the Federal Reserve the freedom to raise interest rates, even though this increased the cost of servicing federal debt. Senator Douglas had clarified that controlling inflation trumped

³⁸ Money, Credit and Fiscal Policies pp. 28-29

³⁹ Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003

controlling federal debt, and showed that leaders in Congress supported Fed independence and an end to pegged interest rates (Meltzer).⁴⁰ The White House and Treasury disagreed and chose to ignore the report, thereby solidifying the alliance between Congress and the Fed in opposition to the White House and the Treasury.

4.2 1950: The Lead Up to the Accord

At the start of 1950 a recession had market actors rethinking prior positions about Fed independence. In particular, as a result of the recession of 1950, banking interests on Wall Street began to see the possible value of higher interest rates allowing for greater profit margins. This prompted Wall Street to begin pressuring government officials in and outside the Fed to respond more directly to market conditions (Flaherty, 2010).⁴¹ But inside the Fed this pressure from the banking community highlighted a growing division between former Chairman (and current Board member) Marriner Eccles and President of the New York Fed, Alan Sproul.

Eccles and Sproul represented very different camps that both sought an independent Fed, but with very different principals. In particular, “Eccles saw the Federal Reserve as mainly a government agency regulating the financial industry and carrying out government policy.” While Sproul “saw the Federal Reserve as mainly a financial institution, blending public and private control (Meltzer, 2003).”⁴² These views mirrored the split between political and non-political control that had plagued the Fed since the Aldrich Plan, but “testimony by Sproul and Eccles

⁴⁰ Meltzer, Allan H., “Politics and the Fed.” *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

⁴¹ Flaherty, Edward. "A Brief History of Central Banking in the United States." Last modified 2010. Accessed July 20, 2013. <http://odur.let.rug.nl/~usa/E/usbank/bankxx.htm>

⁴² Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003.

shows that both recognized a political constraint” even if Eccles viewed the Fed as more constrained, acting as “an agent of Congress.” (Subcommittee on Monetary, Credit and Fiscal Policies, 1950) ⁴³

The internal Fed debate was largely put on hold when the Korean War started in June of 1950. The spending associated with the war effort renewed fears of inflation and forced the FOMC into action. However, instead of raising interest rates themselves, the Fed requested that Treasury Secretary Snyder issue 2.5% bonds ineligible for bank purchase in an effort to raise the short term rate. Secretary Snyder did not comply. This forced the Fed to increase the discount rate, but the Treasury Secretary countered the move by announcing a bond sale at 1.75%, in conflict with the new Fed rate. The bond sale largely failed, but the Treasury refused to issue a 2.5% bond. Although Fed officials continuously warned of rising inflationary pressure and began a credit restraint policy, the policy failed because “the Board was not willing to insist on an independent policy.” As Meltzer concisely says, “politics overrode anti-inflation policy (Meltzer).” ⁴⁴

Conflict between the Fed and Treasury continued through the fall of 1950 with doublespeak and false statements coming from extremely high level meetings. In particular, at the conclusion of a meeting between Treasury Secretary Snyder, Fed Chairman McCabe and President Truman the Treasury Secretary gave a speech declaring that a 2.5% rate ceiling would remain. This announcement greatly exceeded the policy agreed upon by Chairman McCabe. Needless to say, Fed officials were angry, but this would not be the last deception by the President and Treasury.

⁴³ Subcommittee on Monetary, Credit, and Fiscal Policies, 1950

⁴⁴ Meltzer, Allan H., “Politics and the Fed.” *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

4.3 The 1951 Accord

Despite rising tensions between the Fed and Treasury, the entire FOMC agreed to meet with President Truman on January 31, 1951. After the meeting, the White House released the following statement: “The Federal Reserve Board has pledged its support to President Truman to maintain the stability of Government securities as long as the emergency lasts (Eccles, Marriner).”⁴⁵ Essentially, the news ticker note indicated that the Fed had agreed to maintain the stability of the government securities market. Treasury then issued a corresponding statement that interest rate levels would be maintained throughout the duration of the Korean War. Both of these statements were false. The FOMC had never agreed to maintain the rate and the President had never even asked them to do so (Eccles, Marriner).⁴⁶

In the wake of the White House and Treasury deception, former Fed Chairman Eccles elected to release his personal notes from the meeting to the press. The Sunday New York Times and Washington Post both printed articles declaring that the President and Secretary Snyder had lied. This prompted Fed Chairman Thomas McCabe to send blandly worded letters to both President Truman⁴⁷ and Treasury Secretary Snyder⁴⁸ in hopes of calming the growing dispute. But before either had a chance to publicly react, Aubrey Lanston of the Pennsylvania Bankers

⁴⁵ Eccles, Marriner. "Notes from Meeting between President of the United States and FOMC." Last modified Jan 31, 1951. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/062_01_0001.pdf

⁴⁶ Eccles, Marriner. "Notes from Meeting between President of the United States and FOMC." Last modified Jan 31, 1951. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/062_01_0001.pdf

⁴⁷ McCabe, Thomas. "Letter to President Truman." Last modified Feb 7, 1951. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/062_04_0002.pdf

⁴⁸ McCabe, Thomas. "Letter to Treasury Secretary Snyder." Last modified Feb 7, 1951. http://fraser.stlouisfed.org/docs/historical/eccles/062_04_0001.pdf

Association gave a speech in which he said: "We believe it is most desirable that the Federal Reserve become more free than it has been in the past decade to follow a restrictive credit policy at times when this is needed (Langston)."⁴⁹ A few weeks later, the Economists National Committee on Monetary Policy issued a press release titled "51 Members Urge the Importance of Restoring and Maintaining the Independence of the Federal Reserve System."⁵⁰ With the White House and Treasury caught in deception and bankers and economists lining up behind the Fed, the financial press sided with the Federal Reserve over the Treasury from this point forward.

Just as bankers, economists and the financial press began to support the Fed it was announced that consumer prices rose at a 14 percent annual rate. This alarming inflation rate prompted Secretary of Defense James Forrestal to become concerned about inflation and the rising cost of fighting the Korean War. This concern coupled with Senator Douglas and several of his colleagues pushing for Fed independence made for significant pressure to unshackle the Fed from the Treasury.

Negotiations between the Fed and Treasury began almost immediately. The Treasury largely acquiesced and the Fed "agreed to share responsibility for the orderly marketing of government debt." Additionally, the Fed would not change discount rates without Treasury approval over the next year and they would buy \$200 million of 2.5% bonds at the next refunding. In exchange, Treasury let short term rates rise and would allow longer term debt to

⁴⁹ Lanston, Aubrey G. Pennsylvania Bankers Association, "'The Treasury-Federal Reserve Dispute.'" Speech at Annual Meeting of Group 2." Last modified Feb 12, 1951. Accessed July 20, 2013.

⁵⁰ Press Release: Economists' National Committee On Monetary Policy, "51 Members Urge the Importance of Restoring and Maintaining the Independence of the Federal Reserve System." Last modified Feb 28, 1951. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/062_09_0003.pdf.

rise above the 2.5% rate. Essentially, “the Accord in March 1951 was a political agreement (Meltzer).”⁵¹ Although it ended pegged interest rates, it made no mention of optimal policy or long term goals and it did not grant the Fed complete independence. The publicly released agreement stated:

*The Treasury and the Federal Reserve System have reached full accord with respect to debt management and monetary policies to be pursued in furthering their common purpose to assure the successful financing of the Government's requirements and, at the same time, to minimize monetization of the public debt (Joint Fed-Treasury Press Release, 1952)*⁵²

Although it is known by many as the origin of Fed independence, the 1951 Accord was a meekly worded gentlemen’s agreement. It was not official legislation and did not change the legal status of the Fed or its organizational structure. Shortly after the Accord, Senator Douglas even stated “it is not clear just what this agreement means.” This confusion demonstrates how the Accord really served as a catalyst for future events and actions leading to the Fed's ultimate assertion of independence and strength. To this affect, Meltzer argues that "monetary and political authorities have not agreed on a definition of independence... independence is not absolute but leaves open where the limits of government authority lie (Meltzer).”⁵³ It is clear that the Fed ultimately expanded the limits of its independence following the 1951 Accord, in part because of it, but also in response to changing political and economic conditions.

⁵¹ Meltzer, Allan H., “Politics and the Fed.” *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

⁵² Joint Fed-Treasury Press Release March 4, 1951

⁵³ Meltzer, Allan H., “Politics and the Fed.” *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

4.4 Post-Accord

Shortly after the Accord was signed, Thomas McCabe resigned his Chairmanship allowing President Truman to appoint a new Fed Chairman. Truman selected Treasury Undersecretary for Monetary Affairs and the top Accord negotiator, William McChesney Martin. In theory, this selection appeased Treasury by convincing them they had one of their own at the helm of the Fed while also appeasing Fed officials who had known Martin's father, the long-time President of the Federal Reserve Bank of St. Louis. Martin was also expected to calm financial markets since he had once been the head of the New York Stock Exchange. Perhaps most important, Martin understood that he was inheriting an institution "that had not pursued an independent policy since 1933 (Meltzer)." ⁵⁴

Although the 1951 Accord had reduced Treasury's influence, the Fed had agreed to continue assisting the Treasury to some degree. In practice, this meant the "even keel" policy whereby the Fed held interest rates constant for two weeks before and after the sale of Treasury notes and bonds. Upon appointment, Martin was expected to maintain this type of coordination between the Fed and Treasury, thereby limiting Fed independence, not expanding on it. What President Truman had not accounted for was the fact that Martin believed not in "independence from the Government but independence within the Government." This is more independence than Truman expected from a Martin led Fed, and ultimately resulted in President Truman referring to Bill Martin as a "traitor (Bremner, 2004)." ⁵⁵

⁵⁴ Meltzer, Allan H., "Politics and the Fed." *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

⁵⁵ Bremner, Rober P., *Chairman of the Fed: William McChesney Martin Jr. and the Creation of the Modern American Financial System*. New Haven: Yale University Press, 2004.

Given President Truman's disappointment with the level of independence Martin sought for the Fed, it is clear that the President did not expect the 1951 Accord to actually free the Fed from its obligation to the Treasury. In fact, the Treasury did not think the Accord freed the Fed either. Despite his public support, Treasury Secretary Snyder continued to refuse to issue term bonds at more than 2.5%. Given this reaction by both Truman and Snyder, it is clear that the Accord was designed to placate the financial press, stymie a few Senators and allow the administration to continue steam-rolling the Fed on policy issues.

Despite Truman's anger toward Martin and his work to assert Fed independence, the evidence of significant Fed policy change in 1951 and 1952 is less than convincing. The 1952 Annual Report of the Board of Governors of the Federal Reserve System states:

The Federal Reserve System followed a policy of restraining the pace of credit expansion by making it necessary for member banks to borrow in order to obtain reserves. This put them under pressure to restrict expansion of their loans and investments. Thus discount operations at the Reserve Banks again became an effective instrument of credit policy, a further realization of the purposes (Martin)⁵⁶

This claim that the Fed tightened credit in 1951 is not born out in the data. In particular, the President's own economic report in 1953 indicates that the discount rate remained at 1.75% for all of 1951 and 1952 (Council of Economic Advisors).⁵⁷ In fact, that same report indicates that the Fed expanded bank credit through 1951 and 1952 and the money supply expanded:

In both 1951 and 1952, an expansion of Federal Reserve Bank credit was one of the factors which supplied commercial banks with reserves. During 1952, borrowing by member banks provided the greater amount of reserves from this source, while in the previous year the net increase in Federal Reserve Bank holdings of U. S. Government securities was more important. The average of Federal Reserve discounts in 1952 was more than one and one-half times greater than in 1951, but Federal Reserve holdings of Government obligations averaged about the same. The privately held money supply (including the bank deposits of State and local governments) expanded almost 9 billion

⁵⁶ Martin, William McChesney. Annual Report

⁵⁷ Council of Economic Advisers pp. 198

*dollars or about 5 percent in 1952, nearly as much as in the previous year (Council of Economic Advisors)*⁵⁸

Despite the reported anger directed at Bill Martin from President Truman, the evidence does not suggest that Martin immediately asserted Fed independence or used the Accord as his shield through 1951 and 1952, as some accounts have suggested (Meltzer).⁵⁹

4.5 The Korean War and The 1952 Election

Although policy had barely changed, Truman's growing animosity toward Martin demonstrated an attitude toward the Fed in the Democratic Party (aside from Senator Douglas) that was dramatically different in the Republican Party. As the Korean War raged on and the 1952 elections brought about a national choice, the 1952 Republican Party platform included a specific note about Fed independence. They wanted a "Federal Reserve System... without pressure for political purposes from the Treasury or the White House (The American Presidency Project)."⁶⁰ Although this was relevant to the warring factions in the Federal government, the public was for more focused on ending the war in Korea. This emphasis on the Korean War swept General Dwight Eisenhower into office, carrying 39 states.

When Republican Dwight Eisenhower entered office in 1953 he appointed George Humphrey as Treasury Secretary and W. Randolph Burgess became Assistant to the Secretary. Humphrey believed that the Fed should handle the market for government securities (Wells)⁶¹

⁵⁸ Council of Economic Advisers pp. 46

⁵⁹ Meltzer, Allan H., "Politics and the Fed." *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

⁶⁰ The American Presidency Project

⁶¹ Wells, Donald R. *The Federal Reserve System: A History*. Jefferson: McFarland & Company Inc., 2004

and Burgess was a former Fed official. These appointments set the stage for Martin to “restructure the relationship between the Fed and the Treasury, (Bremner, 2004)”⁶² stating that “full Fed independence was an evolutionary process.”⁶³ Treasury Secretary Humphey’s own 1953 report on the state of the finances concisely explained the history of Fed Treasury conflict and how the 1951 Accord was the first step in a long road toward Fed independence:

In the years preceding the March 1951 accord, the Federal Reserve System, under Treasury domination, contributed substantially to inflation by artificial manipulation of the value of Government securities. During and after World War II, the Federal Reserve System lost much of its independence. It was used by the Treasury to raise unprecedented amounts of money, and during the war this requirement completely overshadowed monetary policy. As long as the war was on and Government controls kept wages and prices pretty well in line, there wasn't so much trouble: But when in 1946 direct controls were removed without also concurrently releasing the Federal Reserve, the excesses of the war years brought inflation and hardship to millions of Americans. In the years from 1946 to 1951, the Federal Reserve was a prisoner of the Treasury policy in handling the national debt. Instead of allowing the natural increases in interest rates, the Federal Reserve focused major attention on making sure that the Treasury could handle the debt at low rates. This was not in the best interests of the country as a whole. It resulted in the absence of effective monetary policy until the accord of March 1951. As you gentlemen well know, the March 1951 accord partly restored effective monetary policy to its rightful place in our economy. It laid the groundwork for the policy which the present administration is pledged to continue (Office of the Treasury)⁶⁴

This same report also declared that the Eisenhower administration “assured the Federal Reserve System that it will have the prime responsibility for maintaining the money and credit situation free of artificial restraints in the best interests of all Americans (Office of the Treasury).”⁶⁵ The evidence suggests that these words were not hollow; in 1952 the Joint Economic Committee report on Monetary Policy and Management of the Public Debt referenced

⁶² Bremner, Rober P., *Chairman of the Fed: William McChesney Martin Jr. and the Creation of the Modern American Financial System*. New Haven: Yale University Press, 2004

⁶³ Wells, Donald R. *The Federal Reserve System: A History*. Jefferson: McFarland & Company Inc., 2004

⁶⁴ Office of the Treasury pp. 248

⁶⁵ Office of the Treasury pp. 244

the need for Fed Independence 56 times in just 80 pages (Joint Committee of the Economic Report, 1952).⁶⁶ By 1954, the comparable report from the Joint Economic Committee referenced the need for Fed independence just 4 times in 331 pages Joint Committee of the Economic Report, 1954).⁶⁷ Furthermore, rates were allowed to rise and inflation was kept in check. Ultimately, the Fed-Treasury conflict forced the political parties to take sides and when the Republicans sided with the Fed, the 1952 election and 1953 inauguration of Dwight Eisenhower became a defining moment for Fed independence and this independence helped lead to the most prosperous decade in American history.

5. Conclusion: The Independent Fed Begins to Centralize

The vast majority of literature treats the 1951 Fed-Treasury Accord as the moment declaring Federal Reserve independence, but the political story provided here demonstrates that it was just one event in a chain that led to Fed independence. So, when scholars like Richard Timberlake remark that due to the 1951 Accord “the Fed... was now unfettered” and had “freedom...to devise criteria for monetary policy,” it is obviously hyperbole (Timberlake, 1993).⁶⁸ Although other literature often makes similar remarks, it is an oversimplification to claim that the Accord is a cut-point. In fact, although policy did change as a result of the Accord, the Fed was not untethered from the Treasury until start of the Eisenhower administration in 1953.

⁶⁶ Joint Committee of the Economic Report 1952

⁶⁷ Joint Committee of the Economic Report 1954

⁶⁸ Timberlake, Richard. *Monetary Policy In the United States: An Intellectual and Institutional History*. Chicago. University of Chicago Press: 1993.

Moreover, the meekly worded Accord did not alter the legal status of the Federal Reserve in regard to its principals in the executive and legislative branches.

The more complete story of Fed independence provided here not only dispels the myth that the 1951 Accord definitively severed the Fed from the Treasury, but it also highlights the essential role politics has always played in the Fed's structure and its policy. Although the focus of this paper has been the period leading to Fed independence, it does not assert that an independent Fed is devoid of political influence; politics has persistently played a role at the Fed since its independence. In particular, Fed Chairman Arthur Burns even blamed politics for failings in Fed policy when he said that the Fed had been unable to control inflation because political pressures prevented the central bank from "frustrating the will of Congress to which it was responsible - - a Congress that was intent on providing additional services to the electorate (Burns, 1979)." ⁶⁹ So, despite surviving the long struggle to become independent of the Treasury, the Fed is, to some extent, still beholden to its legislative and executive branch principals who could legislatively reform the institution at any time.

Oversight and the threat of reform from democratically elected officials call into question the value of democracy in dictating technocracy; does the Fed make better policy when experiencing some pressure from the electorate or does insulation from the electorate yield superior policy outcomes? Research by William Bernhard indicates that politically independent central banks help alleviate pressures caused by conflicting political points of view about economic policy (Bernhard, 1998).⁷⁰ Similarly, research by David Stasavage and Philip Keefer

⁶⁹ Burns, Arthur F. The Anguish of Central Banking. The 1979 Per Jacobson Lecture. <<http://www.perjacobsson.org/lectures/1979.pdf>>

⁷⁰ Bernhard, William. "A Political Explanation of Variations in Central Bank Independence." *American Political Science Review*. no. 92 (1998).

indicates that central banking policies are more credible to the market when they bankers are insulated from politics (Keefer and Stasavage, 2003).⁷¹ However, neither of these studies suggest a central bank ought to be devoid of any political influence. In particular, some scholars (Schnidman, 2010)⁷² have suggested that Fed policy might benefit from a more democratic process of selecting decision-makers while simultaneously benefiting from less direct influence by executive and legislative branch officials (Maser and Thompson, 2010).⁷³ Unfortunately, such Fed reform would need to originate in the legislative or executive branches and they are unlikely to structure reform such that they concede turf and therefore have less influence, even if it results in superior policy outcomes.

Since the Fed is unlikely to undergo executive or legislative branch reforms that are beneficial to policy, Fed officials have sought to protect themselves from excessive political pressures. In particular, the Fed has fiercely defended their independence and proactively reformed to protect itself from legislative moves that might infringe on Fed autonomy. Since the 1950s the Fed has moved to centralize in Washington DC and made efforts toward more technocratic, data-intensive policy making. In periods when the Fed has been unable to demonstrate their independence, they have been subject to external reform efforts, like those passed by Congress in 1977 and 1978. Since the 1970s legislation, and particularly since the mid-1990s, the Fed has made a point of self-reforming to head off any external reform efforts. Since 1994 this has manifested as internal moves toward Fed transparency so as to avoid

⁷¹ Keefer, Phil and David Stasavage. "The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy." *American Political Science Review*. 97: pp. 407-423. (2003).

⁷² Schnidman, Evan. Bloomberg News, "Fed Inflation Goal is More Politics than Policy." Last modified Feb 5, 2010. Accessed July 20, 2013. <http://www.bloomberg.com/news/2012-02-06/fed-inflation-goal-is-more-politics-than-policy-evan-schnidman.html>

⁷³ Maser, Steven, and Fred Thompson. "The Fox and the Henhouse: On the Wisdom of GAO Audits of the Federal Reserve." *The Economists' Voice*, Oct 2010.

external, legislative steps to audit the Fed and diminish central bank independence. (Appendix 1)⁷⁴

Ultimately, it is not a question of whether the 1951 Accord is the wrong point to cite as the origin of Fed independence, but it is a question of how that independence changes policy. By understanding that Fed independence was achieved as a result of a series of political moves, rather than a legal contract or accord, it highlights the ever-present role of politics in Fed policy. As Alan Meltzer says, “...politics was a dominant influence on Federal Reserve policy,” and it still is (Meltzer).⁷⁵ These political pressures influence every aspect of the Fed as a policy making institution and they should not be negated in any examination of monetary policy, especially its history.

⁷⁴ See Appendix 1 for a timeline of external versus internal Fed reforms

⁷⁵ Meltzer, Allan H., “Politics and the Fed.” *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

Centralization and Technocracy at the Federal Reserve

ABSTRACT

Despite its origins as a disaggregated network of regional reserve banks designed to aggregate disparate economic preferences, by the 1960's the Federal Reserve System coalesced around the Federal Reserve Board in Washington DC. This centralization coupled with initiatives begun in the late 1950s and early 1960s allowed the institution to grow and change as the U.S. and global economies matured. The archival evidence examined in this paper identifies the key origin of increasing Fed technocracy as an internal Fed program originating in 1963, but the data also indicate that this program arose out of existing internal pressure to advance the research and policymaking capabilities of the Federal Reserve. Evidence suggests that steps toward increasing Fed technocracy largely stalled in the 1970s as a result of new economic challenges, increased political pressure and weak institutional leadership. However, a leadership change in 1979 resulted in a new, dramatically more technocratic Federal Reserve that persisted through the 1980s into the 1990s and 2000s. The story of Fed centralization and technocracy presented here demonstrates the growth and change of a government bureaucracy, largely without statutory mandate. This paper concludes with comments about how the Federal Reserve utilized transparency measures to limit the political ramifications resulting from centralization and increased technocracy.

1. Origins of Centralization and Technocracy

Upon its founding the Federal Reserve was a compromise between Republicans seeking a streamlined network of regional banks comprised of private sector interests and Democrats seeking a centralized entity beholden to government interests. The outcome was a bank with 12 regional banks staffed according to the desires of regional business interests and a board in Washington DC consisting of government appointed personnel. Although the selection mechanism for board personnel changed in the 1930s, the fundamental spirit remained the same; the Board would liaise with the government while regional bank staff would interact with private sector interests. Unfortunately, this system proved unwieldy and resulted in policy failures that contributed to the Great Depression (Moss and Bolton).⁷⁶ During the Depression and into the World War II era the Fed centralized, nominally vesting increased authority in the Board, but with Executive branch officials from the White House and Treasury pressuring toward certain policies, Fed policymakers lacked autonomy. Finally, in the 1950s Fed Board personnel broke away from Executive branch pressures and asserted their independence (Meltzer).⁷⁷ This independence laid the groundwork for increasing Fed centralization and technocratic policymaking.

In examining the evolution of Fed centralization and technocracy, bureaucratic politics plays a pivotal role because this evolution to centralization and technocracy occurred not by

⁷⁶ Moss, David and Cole Bolton. The Federal Reserve and the Banking Crisis of 1931. Harvard Business School Case. January 2009.

⁷⁷ Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003.

legislative or legal initiatives from external powers, but largely by independent, preemptive change within the institution. These changes quelled reform pressures from the Fed's principals in the legislative and executive branches while demonstrating the Fed's first mover advantage in its own institutional reform. Moreover, eras of Fed weakness demonstrate what happens when the Fed fails to act as a first mover in self-reform. In these situations, the Fed's principals do step in and dictate reforms that are less agreeable to those within the institution. These dictated reforms also coincide with diminished Fed credibility which speaks to the power of bureaucratic self-reform as a means to guard both agency independence and reputational legitimacy. It is in this context that it is noteworthy that the Fed is an exceptionally autonomous bureaucracy due to the fact that it is self-funded.⁷⁸ This means that the Fed is not beholden to Congress since it is not seeking appropriations. Similarly, the only power the President has over Fed officials is the appointment of members of the Board of Governors. Since the Senate confirms these appointees, they have some sway over Fed personnel, but the House has no direct influence on the personnel or the Fed's funding; the House must pass legislation that also survives the Senate and the President to directly influence the Fed. This makes for an exceptionally autonomous bureaucracy.

Essentially, the Fed fits the general paradigm of an autonomous bureaucracy constructed by political scientist Daniel Carpenter whereby a bureaucracy with reputational uniqueness and political multiplicity is likely to be autonomous. (Carpenter)⁷⁹ Certainly the Fed has reputational uniqueness; it provides services no other agency does with monetary policy, but perhaps less so with financial regulation. As for political multiplicity, maintaining a stable economy benefits all

⁷⁸ Profits from open market operations fund the Fed's operating budget; excess profit is turned over to the Treasury.

⁷⁹ Carpenter, Daniel. *The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862-1928*. Princeton: Princeton University Press: 2001.

economic actors from business leaders to union members and average consumers. In some respects the Fed's dual mandate ensures that the Fed maintains political multiplicity by forcing it to balance the interests of both capital and labor with regard to price stability and full employment.

Carpenter further asserts that sometimes autonomy can be masked by the seeming convergence of bureaucratic and legislative preferences, but this can be because bureaucrats have successfully changed the minds of politicians over time. The test becomes whether or not bureaucrats take actions consistent with their own preferences even in the face of legislative opposition. In the case of the Fed, many times in its history it has taken action in the face of Congressional opposition; examples include the Volcker Fed's actions during the stagflation crisis, and multiple rounds of quantitative easing between 2008 and 2013 against the wishes of the Republican House majority. These examples lend further support to the assertion that the Fed fits neatly into Carpenter's framework for an exceptionally autonomous bureaucracy.

More generally, the Fed's self-reform also speaks to the bureaucratic politics literature. By utilizing its first mover advantage to self-reform, the Fed has avoided Congressional sanction or reform by establishing transparency measures designed to satisfy its principals, Congress and the President. Further, this study also speaks to emerging cultural anthropology literature examining finance and banking. As anthropologist Douglas Holmes astutely points out, in the modern era of transparent central banks, central bankers use "the economy of words" to communicate policy changes and influence the broader economy (Holmes.)⁸⁰ Essentially, Holmes claims that words (or talk) are the modern policy tool of central banks because their policies have become so complex and difficult to understand that the mere explanation of actions

⁸⁰ Holmes, Douglas. "Economy of Words." *Cultural Anthropology* . no. 24 (2009): pp. 381–419.

elicits market response that constitutes policy in and of itself. While transparency is not the focus of this paper, it is a direct result of centralization and technocracy making the Fed appear powerful and opaque to the public and to its bureaucratic principals. Moreover, as the Fed's bureaucratic tendency toward path dependency in the area of increasing technocracy also lends clues to continued future steps toward transparency.

This paper proceeds by examining the role Fed Chairman William McChesney Martin played in centralizing the Federal Reserve at the Board in Washington DC through the 1950s and 1960s. Archival evidence is presented that indicates that in the 1960s the Board staff began the long process of improving Fed staffing procedures in hopes of creating a more technically inclined institution. Although these steps diminished under new Fed leadership in the 1970s, this period speaks to the role of the Fed Chairman and how inexorably linked Fed independence is with the political independence of the Chairman. When steps toward technocracy resumed in earnest in 1979, despite its decade-long hiatus, overt plans to hire technically inclined staffers seemed to be part of a path-dependent policy at the time. Ultimately, this increase in technocracy yielded changes to policy as well as internal procedures that further centralized power at the Federal Reserve Board where policy was increasingly made based on data, not based on an aggregation of regional economic preferences. Empirical evidence from Fed staffing archives support these assertions about the Fed's growth and shift to technocracy. The paper concludes with a brief discussion of how increasingly technical policy has shielded the Fed from certain types of external pressure, but increased other pressures and forced the Fed to become more transparent.

2. The Martin Fed

After the 1951 Fed-Treasury Accord coupled with the appointment of Treasury official William McChesney Martin to be Chairman of the Federal Reserve and the 1952 election of Dwight Eisenhower, the Fed began to operate increasingly independently. By the mid-1950s the Fed was operating with more autonomy than it had had since before the Depression, but the Fed was now centralized in Washington DC with regional banks playing a less significant role than they had in those early years; at that time each regional bank had the freedom to set their own rates. The 1950s also ushered in a new era of highly educated increasingly technically inclined policymakers at the Federal Reserve Board, both as staff and as Board members.

Although new Fed Chairman Martin lacked formal economic training, he had been head of the Import-Export Bank and the New York Stock Exchange before his tenure in the Treasury department and the Fed. This background gave Martin a wealth of practical knowledge about the economy and about the fact that economics was becoming an increasingly technical discipline. According to former Fed Staff Director for Monetary and Financial Policy Stephen Axilrod, Martin believed the Fed needed to keep pace with the discipline of economics to maintain credibility in the market and to make good policy. This attitude resulted in a massive wave of technocratic innovation at the Federal Reserve Board in Washington DC. They hired a wave of young scholars with Masters Degrees and PhDs to conduct research and present it to the Board. Moreover, although market operations were still conducted through the New York Fed, the Board began to pull key personnel to Washington as it increasingly became the nexus of Fed policymaking. President Nixon believed the Fed Chairman to be so powerful that he openly

criticized Martin for his tight monetary policy leading up to the 1960 Presidential election, blaming Martin for the Republican Party loss (Axilrod).⁸¹

2.1 The 1950s and Fed Criticism

Entering the 1950s with new leadership and newfound autonomy, the Federal Reserve System slowly began to modernize. In this process some regional banks began hiring young academically trained economists, but the “old-guard” was slow to transition to new personnel throughout the decade. Nevertheless, by the late 1950s Herb Schwartz, a Federal Reserve Board staffer, began using punch card computers to conduct regression analysis on economic data (Axilrod).⁸² This step toward using computers accelerated the slow shift identified in “Working at the Board: 1930s-1970s:

A major change that developed over several decades has been in the way data and other information are assembled, worked on, stored, and updated. For a large part of the Board's history, these tasks were handled with what today many would consider very primitive tools: the desk calculator that was used for all data manipulation and ground out the results of simple operations; the manual typewriter that provided final copy only after uncounted retypings of successive drafts; the fourteen-column card that preserved statistical data (entered and updated by hand) and was stored in a clerk's private file case; the nonstatistical records usually kept on pieces of paper in someone's desk drawer.

Nevertheless, a relatively large force of statistical clerks and other record keepers turned out a lot of work with these tools, though it did not need to be, and was not, the complex and sophisticated output demanded in recent years. With the gradual shift through semiautomatic equipment to higher and higher levels of technology, employee skills have needed to be upgraded as well, and employment qualifications have risen (Stockwell).⁸³

⁸¹ Axilrod, Stephen. "Inside the Fed." *MIT Press*, 2011

⁸² Axilrod, Stephen. Interview. 23 November 2011

⁸³ Stockwell, Eleanor (Editor). “Working at the Board 1930s-1970s.” FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 2.

As this passage identifies, the usage of new data storage, aggregation and analysis techniques was forcing the Federal Reserve to “upgrade” their staff. Nevertheless, this movement to improve the Fed was insufficient in the eyes of many Fed critics.

In an effort to understand and satiate critics of the Fed, Chairman Martin requested that Federal Reserve Board staffer James Knipe document and explain criticisms of the Fed in a February 9, 1962 report. In a preface to the report Knipe explains that “this is a re-do, amplification, and updating of my earlier outlines of the Staff Report of the Joint Economic Committee and the Monetary Commission's Report.” The criticisms he identifies coming from the Congressional Joint Economic Committee between 1959 and 1961 include:

- 1.) Monetary policy is not very effective in three areas.*
- 2.) Monetary policy is too effective in three other areas.*
- 3.) The Federal Reserve System is not efficiently integrated into the administration.*
- 4.) The Federal Reserve System is not organized to function efficiently.*
- 5.) Federal Reserve operational results are handicapped by slippages, time lags, inadequacies and ambiguities.*
- 6.) The Federal Reserve is unduly, and wrongly, influenced by private banking interests.*
- 7.) The Federal Reserve promotes high interest rates to make more profits for lenders.*
- 8.) The Federal Reserve shortens economic upswings and stunts national economic growth (Knipe).⁸⁴*

In response to the litany of ways in which the Fed can do nothing correctly without simultaneously doing something wrong, Knipe elaborates that:

⁸⁴ Knipe, James K. . *Office Correspondence: Paper on Public Criticism of the Federal Reserve System* William McChesney Martin Jr. Collection. Missouri Historical Society, 1962. Pages 11-67.

The institutional structure of the American economy in 1961 is one in which, as a result of the increased strength of highly-organized power blocs—labor, industry, agriculture — prices will have a tendency to rise whenever men and machines are operating at anywhere near to capacity. The purchasing power of the dollar is, therefore, subject to possible further deterioration within the next few years. As an important agency especially interested in the integrity of the dollar, the Federal Reserve will find itself again in the unenviable position of having to decide whether or not to restrain what it looks on as "inflationary excesses," at times when its critics may regard the economy's performance as unsatisfactory, and not even near to "inflationary excesses,"

If the System continues to act with courage, it will inevitably face a continuing barrage of criticism. The criticisms will be, as in the past, general and specific, fair and unfair, but they may become more powerfully voiced as time goes on. In order to defend itself with sufficient skill and energy to maintain its effectiveness, the Federal Reserve will need to put forth much greater efforts than in the past to gain public support for the policy formulations which will come nearest to meeting all the needs of all the people (Knipe)⁸⁵

Although vague, Knipe's observation that the Fed will need to gain public support in order to defend itself and remain effective ultimately proved true in the late 1970s into the 1980s and again in the 2000s, but before the Fed faced widespread public criticism; the institution faced targeted criticism from members of Congress.

Beginning in the 1950s and extending into the 1970s, two of the most ardent Fed critics were Congressman Wright Patman (D-TX) and Senator William Proxmire (D-WI). In the 1960s these members of Congress led their respective chambers' banking committees and several Fed relevant subcommittees. Functionally, this meant that "when the Fed wanted a change in banking legislation, it was usually through these two chairmen that it had to proceed." (Stockwell)⁸⁶ A brief historical examination of what it was like to work at the Fed Board between 1930 and 1980

⁸⁵ Knipe, James K. . *Office Correspondence: Paper on Public Criticism of the Federal Reserve System* William McChesney Martin Jr. Collection. Missouri Historical Society, 1962 Page 68.

⁸⁶ Stockwell, Eleanor (Editor). "Working at the Board 1930s-1970s." FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 26.

referred to oversight by these two chairmen as an “inquisition.” This same document described the chairmen as follows:

Patman was a populist, who regarded the Fed's occasional tight money forays as an oppression of the common man. Proxmire was a thrifty liberal, who advocated activist government but detested spendthrift bureaucrats and inefficient programs. Each of them found plenty of opportunities to try to trim the Fed's wings. A hearing before either of these gentlemen was something of an ordeal. Word of a new invitation to testify before either one was typically greeted around the Board with the institutional equivalent of a sigh. Preparations for the appearance were strenuous. Often a very substantial support document was required. Weeks and sometimes months of staff time were spent in its preparation. The testimony itself often included a good deal of grilling of the Fed witness by the committee chairman, rather in the style of a determined prosecuting attorney. It was a rare day when the Fed's representative could return from such a session and say "I got what I wanted."

Sometimes Patman and Proxmire would turn the tables on the Board by introducing some proposed new legislation that would take away some cherished Fed power or privilege. Bringing budgets of the Board or the Federal Reserve Banks under congressional control was a favorite thrust, and one the Fed regularly resisted. To the Fed, this breached the carefully crafted insulation from pressure politics that had been a key part of the legislation that had created it. As a practical matter, the Fed was a "cash cow" for the federal government, (a byproduct of its congressionally given power to create money) rather than a net user of federal budgetary resources, and every Federal Reserve spokesman knew that. To help prove groundless the recurrent charge by Patman and Proxmire that the Fed was a wasteful spender of resources, the Board often turned the budget screws as tight on itself and the Federal Reserve Banks as the Administration and the Congress were endeavoring to do to the rest of the federal government. Nobody on the Board staff enjoyed these episodes. In fact, the Board was not a lavish spender to begin with, so often what resulted were marginal spending curtailments that took nicks out of a sizable number of cherished projects, programs, and perquisites, of which the most important were undoubtedly staff salary increases (Stockwell)⁸⁷

As these passages illuminate, not only did preparation for hearings held by Patman and Proxmire requiring significant staff hours, they often resulted in voluntary Fed budget cuts to keep their critics satisfied. These budget cuts notably cut into staff salaries, thereby limiting the rate at which the Fed was able to grow and acquire technically qualified staff.

⁸⁷ Stockwell, Eleanor (Editor). “Working at the Board 1930s-1970s.” FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 27.

2.2 Personnel Changes in the 1960s

Despite the financial belt-tightening to avoid Congressional control over the Fed budget, in 1963 Daniel Brill, then Director of Research and Statistics at the Federal Reserve Board, convinced Chairman Martin that the fed needed more “expert economists” (Axilrod).⁸⁸ The result was the hiring of a series of PhD economists from top-tier PhD programs to work in the Research and Statistics division. By the mid-1960s, the International Finance division headed by Robert Solomon had also begun hiring technically inclined PhD economists. Similarly, of the five documented finalists for an appointment to the Federal Reserve Board in 1964, four had advanced degrees (three PhDs and a JD) and just one ended his education with only a bachelor’s degree (Dillon).⁸⁹ By comparison, at that time only about 40 percent of Americans had completed high school and only about 10 percent of adults were college educated. This means that Fed personnel were substantially more educated than the general public and the 1963 initiative begun by Daniel Brill had instigated a policy of hiring top notch PhD economists to widen this education gap and increase the level of technical skills of personnel throughout the Federal Reserve System.

In an attempt to summarize the changes at the Fed in the 1960s, an examination of working at the Federal Reserve Board from the 1930s through the 1970s wrote:

The decade of the 1960s soon brought a fresh breeze to both the nation and the Federal Reserve. The election of 1960 put a young and vigorous President in the White House. He exuded confidence in rational thought. He arrived with some fresh ideas, and he was in the market for more. Accordingly, in a number of his early appointments he chose highly trained, intellectually curious individuals with forward-looking attitudes. They brought new ideas of their own and of other thinkers into policy circles. One such appointment was the naming of George Mitchell to membership on the Board. Mitchell was a blunt-spoken fiscal expert and research director at the Federal Reserve Bank of Chicago. His

⁸⁸ Axilrod, Stephen. Phone Interview. 23 November 2011

⁸⁹ Dillon, Douglas. *Memorandum for the President McChesney Martin Collection*. Missouri Historical Society, 1964.

style of probing inquiry into Federal Reserve issues took some getting used to, but in time his colleagues on the Board and the staff came to appreciate it. In this atmosphere of intellectual challenge the Board staff responded vigorously. Friendly debates on policy issues great and small were common in the Board offices and over the cafeteria tables. The directors of the two research divisions, Arthur Marget and later Ralph Young for the Division of International Finance and Jack Noyes and later Dan Brill for the Division of Research and Statistics, were open to bringing in outside experts to exchange ideas. Brill was particularly adept at drawing thought-provoking scholars of varied backgrounds into the Board's offices for occasional talks or short stays. A somewhat more collegial tone came to pervade the halls of the Board. The Board even established a panel of outstanding academic consultants, who provided some very stimulating exchanges in their periodic meetings around the Board table (Stockwell)⁹⁰

This outline of the steps the Fed took toward increasing the technical skills and intellectual caliber of Fed officials highlights how deliberately staff pursued their goals on improving the intellectual environment at the Fed. Moreover, the only reference to another branch of government in this passage is a clouded one referring to the election of President Kennedy and a single Board appointment he made, yet these outside gestures were a cue for Fed personnel to run toward technocracy.

The technocratic ethos was so pervasive that in 1964 the Fed rolled out its first edition of the report entitled “Current Economic and Financial Conditions,” otherwise known as the “Green Book.” These reports are still distributed prior to each FOMC meeting and consist of a summary of the current economy, recent developments in the economy, and current financial conditions. Since inception the Green Book has been produced by the staff of the Board of Governors.

In a follow-up to the Green Book, in 1965 the Board staff rolled out the first edition of “Monetary Policy Recommendations,” otherwise known as the “Blue Book.”⁹¹ These reports are

⁹⁰ Stockwell, Eleanor (Editor). “Working at the Board 1930s-1970s.” FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 21.

⁹¹ Transcripts and Other Historical Materials

the hallmark of an increasingly centralized and information-oriented Fed becoming a developed bureaucracy with the need to create written documentation and formal communication.

Moreover, both the Green and Blue Books originated from the Board staff, not the regional banks, thereby demonstrating increased centralization of Fed policy in the mid-1960s. This is a particular point of interest because while it is logical that the Board staff recommend policy alternatives based on the data, it is not necessarily logical that the Board staff be responsible for analysis of national data given that each region is specifically charged with examining economic conditions in its district. This left district bank personnel without a technical data source to express opinions and preferences when it came time for FOMC meetings.

The addition of highly trained personnel fostering greater intellectual debate along with more concrete mechanisms to convey research to key policymakers, it is reasonable that the Fed's own records proclaim that by the end of the 1960s "the Board had equipped itself with a new generation of tools for economic analysis, a new managerial system, and a new generation of staff leadership with which to respond to the challenges of the 1970s (Stockwell)." ⁹² This statement alone demonstrates not only the technical eye with which the Fed developed in this era, but also the degree of policy centralization that permitted such a comment to only reference the Board, not the regional banks.

3. The 1970s: Inflation and Retrenchment

The 1970s began with the retirement of the Fed's longest serving Chairman, William Martin, whom President Nixon replaced with noted business cycle economist Arthur Burns.

⁹² Stockwell, Eleanor (Editor). "Working at the Board 1930s-1970s." FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 27.

Despite his qualifications as an expert in business cycles, Burns was known to lack significant quantitative skills. But as the Chair of the Council of Economic Advisers under President Nixon, he had built a rapport with the President; this led to the perception that Burns was easily swayed by Nixon to ease monetary conditions. This perception combined with uncontrolled inflation during his tenure means that the Burns era Fed was known more for lack of policy credibility than any significant policy achievements or internal changes to the institution. In large part, this lack of notable achievements by the Fed in the 1970s can be attributed to three factors. First is the collapse of the post-WWII Bretton Woods system of international finance that turned the U.S. dollar into a fiat currency. Second is the political pressure placed on the Fed from the Nixon administration, and third is the new set of regulatory and transparency laws that increased the Fed's responsibilities.

3.1 Fed Shortcomings

The collapse of Bretton Woods had the largest and most direct economic impact. When the U.S. unilaterally left the gold standard in August of 1971, many foreign countries increased holdings of dollars as a reserve currency. This increased demand for U.S. dollars and prompted White House officials to call Fed Board Director of Research and Statistics, Charles Partee, to the White House specifically to emphasize that all policy decisions should be made with consideration toward how to make the government's preferred measure of money supply, M2, grow (Axilrod).⁹³ This political pressure combined with the dollar being in uncharted territory as both a fiat currency and a global reserve currency resulted in elevated and rising inflation through the 1970s.

⁹³ Axilrod, Stephen. Phone Interview. 23 November 2011

Many historical and political accounts of the Fed in this era emphasize the high degree of political involvement in Fed policy, with a particular focus on the relationship between Richard Nixon and Arthur Burns. The intricacies of this relationship were on full display in the period leading up to the 1972 election.(Axilrod) ⁹⁴ Although the level of influence wielded by the President in 1972 is up for debate, Burns did ease monetary conditions. Burns (or Fed) defenders have pointed out that in 1972 Burns was faced with the dual role of both Fed Chairman and Chair of the newly formed Committee on Interests and Dividends (CID). Since CID was designed to deal with wage and price controls, by serving both roles Burns was inherently conflicted since easing credit would make wage and price controls easier to implement. So, even if President Nixon was not directly pressuring Burns, by appointing him to these dual roles he forced the Fed Chairman to advocate easier monetary policy than he might have otherwise been comfortable with. Moreover, despite post-hoc Congressional criticism, Burns was encouraged to ease conditions through 1972 by members of Congress from both parties (Woolley) ⁹⁵ Ultimately, the result was rampant inflation and declining credibility of the Federal Reserve as a result of both ineffective policy and perceived lack of political independence by the Fed Chairman.

In an effort to characterize the chairmanship of Arthur Burns, former Fed Staff Director for Monetary and Financial Policy, Stephen Axilrod states:

It was not that Burns...did not make a sustained effort to be a leader and to influence the policy decisions made by the FOMC. He most certainly did....But his actions were, as the now common expression has it, "inside the box." They were basically maneuvers, not grand performances that might have persuaded an audience (his fellow policymakers, for

⁹⁴ Axilrod, Stephen. "Inside the Fed." MIT Press, 2011

⁹⁵ Woolley, John T. *Monetary Politics: The Federal Reserve and the Politics of Monetary Policy*. Cambridge: Cambridge University Press, 1984.

instance, not to mention the country as a whole) to see the economy and policy from a paradigmatically different viewpoint (Axelrod)⁹⁶

Unlike his predecessor, Burns merely maneuvered within the existing confines of the institution, never testing its limits, expanding its scope or exploring new ways to solve new (or old) problems.

Aside from Mr. Axelrod's view, the internal Fed perspective on the challenges and policy failings of the 1970s tends to avoid an emphasis on leadership and focus on the new responsibilities the Fed was forced to accept while Congressional pressure limited the expansion of Fed staff. An internal examination of the Fed in the 1970s points to a litany of new responsibilities and transparency procedures:

...massive data gathering, numbers crunching, and monitoring as the Fed did its part...to contain inflation by freezes, controls, voluntary restraints, and similar programs in 1971-74; adapting Board procedures and rules to the invasive Freedom of Information and Government in Sunshine legislation of 1974 and 1976; overhauling all the Board's regulations to make them more readable, to update them, to cut out deadwood, and to ease regulatory burdens; adapting to an increasingly demanding series of new reporting and recordkeeping requirements by the Congress; developing a national network of computerized regional centers for over- night check clearance; developing, together with other federal banking supervisors, uniform examination procedures; and initiating a long-term squeeze on banks and bank holding companies to improve capital ratios(Stockwell⁹⁷)

This examination goes on to examine the enormous workload of the Board staff in the 1970s:

The Board held an average of 139 meetings yearly during the decade. The Governors were required to prepare for discussion of each agenda item, involving a heavy reading and study load. The Secretary's office had to prepare the Boardroom for meetings, prepare the agenda, and keep the official record. The legal staff had to be prepared to discuss any agenda item with legal complications (the majority). After enactment of the Government in the Sunshine Act, the legal staff had to determine, in light of the requirements of the act, what meetings or what agenda items should be open to the

⁹⁶ Axelrod, Stephen. "Inside the Fed." MIT Press, 2011, page 64.

⁹⁷ Stockwell, Eleanor (Editor). "Working at the Board 1930s-1970s." FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 29.

public. The public affairs office had to announce in advance what items would be discussed in public....

The Legal Division produced ninety-three proposed and final regulations, interpretations, and policy statements in 1970; 102 in 1977, and 159 in 1978: an average of 126 a year in the 1970s. The Board's legal submissions to the Federal Register took up 346 pages in 1970 and 899 pages in 1979. The division counts twenty-five major pieces of legislation passed in the 1970s affecting the Fed.

Production of news releases covering proposed and final regulations, policy statements, and like substantive subjects rose from fifty-one in 1970, to seventy-one in 1975 and to ninety-two in 1979...

The Chairman and other Board members testified before the Congress seven times during 1970, an average of fifteen times a year in the first half of the decade and an average of forty-two times a year in the last five years, including sixty appearances in 1979. The Board established a Freedom of Information Office in 1974 under the amended FOI Act. The FOI office answered 3,969 queries under the act that year, 5,112 in 1979, and an average of 4,455 from 1974 to 1979, rejecting only 2.4 percent of requests received (under FOI Act exemptions) (Stockwell).⁹⁸

This litany of new responsibilities associated with new regulations and increased public scrutiny concludes with the telling statement that “while the Board's work grew manifold, its staff grew during the 1970s less than two-thirds, from 902 to 1,451.” While these figures mark enormous bureaucratic growth, the litany of new responsibilities really highlight that this growth was largely in excessive repetition of the same procedures done in prior decades. Moreover, some of these duties, like regulating foreign banks operating in the U.S., were requested by Fed personnel. Nevertheless, perhaps the most telling aspect of Fed policy in this era is that the crowning achievement of the Federal Reserve Board in the 1970s was the construction of the 1974 completion of the new William McChesney Martin building (Stockwell).⁹⁹

⁹⁸ Stockwell, Eleanor (Editor). “Working at the Board 1930s-1970s.” FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 30.

⁹⁹ Stockwell, Eleanor (Editor). “Working at the Board 1930s-1970s.” FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 30.

3.2 Responses to Policy Failure

While Board personnel might blame external pressures for the Fed's shortcomings in the 1970s, these pressures did not arise exogenously. In particular, the lack of internal reform efforts in the face of an inflationary crisis resulting from the collapse of Bretton Woods yielded the first mover advantage from the Fed to its principals who deemed reform necessary. After less formal attempts to restructure the Fed toward more transparency earlier in the decade, Congress ultimately passed the Federal Reserve Reform Act of 1977 which initiated quarterly reports to the Congress from the Fed and established Senate confirmation of the Chair and Vice Chair of the Board (they had previously been selected by the President without confirmation necessary to be elevated from member of the board to Chair). Perhaps more important from a policy perspective, the 1977 Act established an explicit goal of promoting maximum employment and price stability, making the dual mandate a statutory obligation from that point forward. This mandate was strengthened in the 1978 Humphrey-Hawkins Act which dictated that the Fed maximize growth, minimize inflation and promote price stability (Flaherty, 2010).¹⁰⁰ While these acts may not have dramatically changed policy, they demonstrate how lack of internal bureaucratic reform and adaptation can create external pressure forcing the principals to dictate reform as they see fit.

Despite the fact that the dual mandate is now synonymous with the Fed, the impact of these reforms was severely blunted by the change in Fed leadership to someone notably less suited to the Chairmanship than Arthur Burns, William Miller. Miller held the post of Fed Chairman for only 17 months (he then became Treasury Secretary) because he sought to run the

¹⁰⁰ Flaherty, Edward. "A Brief History of Central Banking in the United States." Last modified 2010. Accessed July 20, 2013. <http://odur.let.rug.nl/~usa/E/usbank/bankxx.htm>.

bureaucratic Fed in the same way he had previously run private sector businesses. Though brief, his tenure demonstrates that the skill set required of a Fed Chairman is not that of a CEO running a top-down, vertically integrated corporation; the Fed is something of a hub-and-spoke system with central power and many smaller arms needed for the wheel to move forward. Stephen Axilrod characterizes Miller's struggles with the Chairmanship as follows:

The whole monetary process involved a bureaucratic apparatus that was unfamiliar and in many ways trying. Depending on whether a decision was to be made by the board or by the FOMC, either six or eleven other people beside the chairman had equal say in it. His colleagues' underlying motivations often were not clearly expressed, if expressed at all. Implementation of a decision relied on policy levers that—because of economic uncertainties, market complexities, unpredictable attitudinal shifts, and long lags—were not well or clearly linked to the institution's ultimate objectives. Even if long-term goals might be easily stated (it took no effort to favor price stability and growth, for example), how to approach them, what objectives should be emphasized in the nearer term, and how best to reconcile possible conflicts among them were always up for negotiation (Axelrod)¹⁰¹

Essentially, William Miller proved even weaker than Burns and through the 1970s the Fed yielded its first mover advantage on internal reform back to its principals who passed a series of legislative reform initiatives.

Despite new responsibilities, increased workload and lack of effective leadership, the path toward technocratic policymaking was still quietly being pursued. Stockwell's account of working at the Federal Reserve Board in the 1970s states that:

In the back rooms of the research division, experimental work with the new science of econometric modeling was going on. This was mind-stretching work for Frank de Leeuw and the rest of the staff involved, and practical benefits did not come quickly. It was not until the decade of the 1970s that the output from econometric models became a really important part of the analytical material that the Board and the Federal Open Market Committee weighed in their deliberations. Such work involved more and more number crunching and was heavily dependent upon the developing computer capability within the staff (Stockwell, 22)¹⁰²

¹⁰¹ Axilrod, Stephen. "Inside the Fed." *MIT Press*, 2011, page 77-78.

¹⁰² Stockwell, Eleanor (Editor). "Working at the Board 1930s-1970s." FRASER Electronic Records: Federal Reserve Bank of St. Louis (1989), Page 22.

It is this continued work “in the back rooms” that allowed the Fed to technocratically leap forward under the leadership of Paul Volcker beginning in 1979.

4. An Era of Technocracy: The Volcker Years

After the ambivalence and perceived political pressure of the Burns chairmanship and the ineffectual nature of Miller’s brief tenure, the Fed faced something of a crisis of confidence. The American public had diminished respect for the institution and the lack of credibility in combating inflation had fueled increasingly severe political backlash, particularly from Congress. Then, in 1979 President Carter appointed former Fed staffer, Treasury official and sitting President of the Federal Reserve Bank of New York, Paul Volcker, to be Fed Chairman. Volcker’s tenure was marked by a technocratic shift that allowed for new methods in monetary policy that helped rein in inflation and restore Fed credibility. Volcker’s background in the Fed and Treasury provided vast technical knowledge and a great sense of the bureaucratic barriers within the institution. Unlike his immediate predecessor, Volcker understood that being Fed Chairman was not a dictatorial position, but one of consensus building. So, despite a lack of legal or statutory justification, Volcker utilized innovative policy, bureaucratic maneuvering, and direct public communication to reshape the Federal Reserve (Axilrod).¹⁰³

Volcker’s first step in reshaping the Fed was a series of novel methods to halt inflationary pressure. Volcker was well aware that the Fed controlled the price of money, but the quantity depended on the demand by economic actors given the cost (interest rate). Functionally, this meant that interest rate changes were too slow and incremental to respond to uncontrolled

¹⁰³ Axilrod, Stephen. Telephone Interview.

inflation. Volcker solved this problem by targeting the quantity of money, not just its price. This meant that if economic actors needed more money than the Fed had targeted, then interest rates would rise because the Fed would refrain from supplying money through open market operations. Moreover, instead of a firm target at a particular interest rate, in order to keep pace with rapid changes in economy, the Fed Funds Rate fluctuated in a four or even six point band in the six weeks between FOMC meetings. This innovative approach demonstrated the Fed's capacity to fight inflation and the seriousness with which it set out to do so (Axilrod).¹⁰⁴

Although not permanent,¹⁰⁵ this shift in Fed methods had a lasting effect. Just as Martin had centralized power through the Board staff, Volcker had relied on expert staff (himself a former Fed staffer) to institute a new and untested policy. This policy relied on seamless transmission of information between the Board in Washington DC and the personnel at the New York Fed (where Volcker had been President) who implemented the policy. It also relied on the value of public communication between the Fed Chairman and the public in order to garner enough support to avoid political pressure from the Fed's principals.¹⁰⁶ Perhaps most importantly, this new method relied heavily on a large number of policy makers having enormous technical knowledge about all the levers of monetary policy, not just the Fed Funds Rate. In describing the technical nature of this policy shift and the need reason for Volcker's success instituting a policy shift, Axilrod states:

He was the essential man for a combination of reasons. He combined great sensitivity to shifting trends in political economy (he could see what the country would now accept) with a willingness to take dramatic action. Moreover, he was technically very competent in the nuts and bolts of monetary policy, which made it easier for the FOMC and the

¹⁰⁴ Axilrod, Stephen. "Inside the Fed." *MIT Press*, 2011, page 92-93.

¹⁰⁵ After inflation was controlled the Fed returned to utilizing the Fed Funds Rate to control the price of money.

¹⁰⁶ Political pressure was a very real threat as the public faced 20% interest rates.

chairman himself to feel confident that the new approach, although not risk free, had a reasonably good chance of working (Axelrod)¹⁰⁷

In an effort to examine the particular internal Fed dynamics of the “Volcker Revolution,” political scientist Cheryl Schonhardt Bailey and economist Andrew Bailey examined FOMC meeting transcripts from the era. They found that Volcker seamlessly maneuvered through the Fed bureaucracy by utilizing different strategies to appeal to different constituencies within the institution in order to garner support for the policy shift. They characterized his strategy in appealing to Board members as one of “repentance” whereby the Fed must publicly recognize its mistakes and seek to fix them. With the regional bank presidents Volcker emphasized the need to commit to a particular strategy in order to maintain Fed credibility. And with the staff, Volcker emphasized the technical fact that previous models had underweighted the role of money quantity, so they must rectify this with new models. Of these three strategies, the first two were largely rhetorical while the third, the one targeting the staff, involved technical elements of economics. Not surprisingly, the technical “money matters” argument prevailed as the preeminent method by which the Fed engaged in market behavior between 1979 and 1982 (Bailey and Bailey).¹⁰⁸

Echoing the Baileys’ finding that Volcker relied on the Fed staff to engage in a highly technical strategy for reining in inflation, political scientist Jack Knott asserted more than 20 years earlier that Volcker relied on his technical expertise, connections to the Fed staff, and the centralization of power established by Martin to ensure a particular type of data was supplied to policy makers. Essentially, Volcker leveraged his expertise and connections to the technocratic staff in order to operate as an informational gatekeeper to the FOMC. This use of the staff and

¹⁰⁷ Axelrod, Stephen. “Inside the Fed.” *MIT Press*, 2011, page 89

¹⁰⁸ Bailey and Bailey

data allowed Volcker to build a political coalition within the Fed and outside of it (through public statements) that increased Fed credibility and put pressure on policy makers to agree with Volcker's policy positions (Knott).¹⁰⁹

Even after the inflation crisis subsided Volcker sought to increase the role of the staff and the technical nature of monetary policy by further involving the regional bank personnel. In 1983 Volcker introduced the "Summary of Commentary on Current Economic Conditions by Federal Reserve District" otherwise known as the "Beige Book." This allowed the expert staff of each regional bank to issue a report to the FOMC two weeks prior to meetings, thus functionally eliminating the need for verbal expression of opinions about regional economic conditions by regional bank presidents (Transcripts).¹¹⁰ Once again, Volcker had found a way to elevate the role of the technocratic staff and the importance of data above the value of more pluralist expressions of opinion about economic conditions. This is not to claim that regional bank data was not shaded to accommodate regional economic preferences, but the Beige Book certainly shifted the emphasis to data above anecdotal information.

Despite his success curtailing inflation, and although reappointed by Ronald Reagan in 1983, Paul Volcker was not reappointed again in 1987. By the mid-1980s Volcker began to clash with the supply side ideology of the Reagan White House, particularly Council of Economic Advisers Chairman Martin Feldstein and later Chairman Beryl Sprinkel. As this ideology pervaded the Treasury and several Reagan appointees to the Federal Reserve Board it caused clashes over the Fed's role in financial regulation. The administration loyalists sought a more deregulated financial marketplace, while Volcker saw a need to for continued regulatory action.

¹⁰⁹ Knott, Jack. "The Fed Chairman as a Political Executive." *Administration and Society*. 18(2): pp. 197-231. (1986).

¹¹⁰ Transcripts and Other Historical Materials

Three separate attempts were even made by Congressman Henry Gonzalez (R-TX) to impeach Volcker and the entire Federal Reserve Board, but the legislation died in committee each time. (Meltzer)¹¹¹ Nevertheless, these clashes elevated internal Fed concerns about the growth of their budget and raised fears that they might lose their prized autonomy that had been so crucial to the growth of their technocratic staff.

Paul Volcker was not reappointed in 1987, but was instead replaced by noted libertarian economist Alan Greenspan (Axilrod).¹¹² Three years before his departure, in a prescient speech at the Cosmos Club, Paul Volcker explained that“... the fundamental justification for the structure of the Federal Reserve System is to remove that policy to a degree from the passions of passing politics — politics in the narrow sense — and from electoral considerations (Volcker, 17).”¹¹³ Ultimately, it was politics that prevented Volcker from continuing the work toward an increasingly technocratic Fed, but despite their ideological differences, his successor eagerly continued the trend in technocratic policymaking.

5. Technocracy Leads To Opacity and Skepticism

As Alan Greenspan continued the work of technocratic growth and decision making at the Fed, it became clear that like the backlash to centralization Arthur Burns experienced in the 1970s, Greenspan could face a backlash to technocracy in the 1990s. Rooted in confusion and speculation about the Fed’s role in the economy, skeptics began a public campaign to shed sunlight on the Fed. The early parts of this campaign took the form of the somewhat whimsical

¹¹¹ Meltzer, Alan. *A History of the Federal Reserve*

¹¹² Axilrod, Stephen. "Inside the Fed." *MIT Press*, 2011.

¹¹³ Volcker, Paul A. "1984 Cosmos Club Award Remarks." 3 May 1984, Page 17.

“briefcase watch” whereby reporters would follow Chairman Greenspan on the morning of an FOMC meeting to see if his briefcase was thick or thin. The thought was that if it was thick Greenspan had been reviewing data and the Fed Funds Rate was more likely to change. As the public scrutiny mounted, unlike Burns, Greenspan opted to utilize the Fed’s first mover advantage and provide a small amount of transparency. Since the mid-1990s these transparency measures have been gradually increased and steps toward transparency only accelerated under Greenspan’s successor, Ben Bernanke.

This demand for transparency in the 1970s and again in the 1990s and 2000s suggests that the public seeks Fed accountability when any two of three conditions are met. First, the Fed is failing to do its job; price stability and/or employment are far from desired levels. Second, the Fed is perceived as too powerful and accountability will serve as a check on this power. Third, the policy made by the Fed is too complex to be understood by laypeople and/or the Fed’s principals in Congress, and transparency is a means to explain policy and quell fears about what people do not understand.

The 1970s marks a period in time when the Fed was both failing to do its job and, in the absence of the Bretton Woods system, the increasingly centralized Fed appeared more powerful than ever before. The 1990s exemplified the power of the Federal Reserve, but the technical response to financial crises in Asia also created public consternation about what exactly the Fed was doing. Finally, the late 2000s were punctuated by Fed policy failure coupled with a massive and confusing policy response to the 2008 financial crisis. Given that the demand for transparency so clearly arose when these conditions were met in the 1970s, 1990s, and 2000s, this leads to the question of why no such demand for transparency arose earlier in the Fed’s history. Although some Fed restructuring took place as a result of policy failures during the

Great Depression, the lack of cries for transparency provide a clear indication that prior to the 1970s the Fed had not been sufficiently centralized or technocratic to arouse a critical mass of public suspicion.

5.1 The First 30 Years

While anecdotal and archival evidence has been provided to support the assertion that prior to the 1970s and especially the 1990s the Fed had been neither centralized nor technocratic enough to arouse public suspicion, quantitative evidence also supports this point. As a clear indication of the advances in centralization and technocracy at the Fed, an examination of the Fed's own archival data indicates that of the 36 Fed Board members who served in the Fed's first 30 years (1914-1954):

...12 ended their formal education with a bachelor's degree and 14 added advanced degrees, making a total of 26 or 72.02% who went through college. Bank presidents include 45% in the same category, chairmen 49.4%. Among directors, curious differences catch the eye. Of the Class A directors, only 30.7% went through college (9.9% with an advanced degree) and 13.4% finished their formal education' with the end of grammar school. Of Class B directors, 45.6% went through college (16.1% took a higher degree) and 14.4% stopped with grammar school. Among Class C directors, 40.2% had at least a bachelor's degree (26% took a higher degree) and only 9.1% had to be content with grammar school. Less than half (40.7%) of the men who have acted as Federal Reserve Bank directors during some part of these forty years were college graduates, while the group as a whole is divided almost equally between those who did and those who did not go to college (Committee on the History of the Federal Reserve System, 1-2)¹¹⁴

This report goes on to say that “these men were mostly over fifty when they entered their high office...” indicating that many of them had gained the respect needed to be appointed/selected

¹¹⁴ Committee on the History of the Federal Reserve System. Pages 1-2.

from a great deal of private sector work experience. Table 1 specifically identifies the education levels of Fed Board members between 1914 and 1954.

Table 1: Highest Level of Education Completed – Board Members 1914-1954 (Committee on the History of the Federal Reserve System, 5) ¹¹⁵

| Board Member | Grammar School | High School | College | Advanced Degree | Info Not Available | Total |
|-------------------|----------------|-------------|---------|-----------------|--------------------|--------|
| Number | 1 | 7 | 12 | 14 | 2 | 36 |
| % of Total | 2.8 | 19.4 | 33.3 | 38.9 | 5.6 | 100.0% |

While these numbers seem staggeringly low by the modern standards to which we hold our economic policymakers, it is worth note that in 1940, only about 1/4th of Americans had at least a high school education, and only around 1/20th had completed college. By 1950, the number that completed high school rose to roughly 1/3, but college education levels had barely risen. So, personnel at the Federal Reserve was still significantly more educated than the general public, but this does not mean that they had the expertise necessary to make effective policy decisions. Moreover, the fact that average ages of Fed personnel were in their 50s indicates that these individuals reached their post through political and business connections. These connections carried a great deal more weight within the regional banks than on the national political scene in Washington DC.

The staggeringly small size of the Federal Reserve System during this period also explains why the Fed was not a lightning rod for criticism and requests for transparency in its early history. Specifically, in the entire 30-year period between 1914 and 1954 the whole Federal Reserve System employed just 81 PhD economists, 14 MA, MBA or JD's and 44 people with unknown educational backgrounds. Moreover, in 1931 the Federal Reserve Board employed just

¹¹⁵ Committee on the History of the Federal Reserve System. Page 5.

10 staff members. By 1941 this number had grown to 22 and in 1951 it was 34. Even five years into William Martin's tenure as Fed Chairman (1956) the Board still employed just 42 staff members. By contrast, in 2013 the Federal Reserve Board alone employs over 450 staffers, and according to their website, 296 of them are PhD economists (The Economists).¹¹⁶ That is more than 3.5 times as many PhD economists as the entire Federal Reserve System employed over the course of its first 30 years and these figures do not count the massive growth of regional bank staffs.

5.2 Regional Banks

Although staffing data from the regional banks is difficult to obtain because they are private entities not required to comply with the Freedom of Information Act, the available data also indicates broad steps toward technocracy took place at regional Fed banks across the U.S. Table 2 provides data on the background of regional bank presidents beginning in 1950. As this table illustrates, since the middle of the 20th Century the regional Fed banks have almost uniformly made strides toward being led by a president with either vast government experience as a public servant, or the educational background of a PhD.

¹¹⁶ The Economists.

Table 2: Regional Bank President Backgrounds ¹¹⁷

| Year | Banker/Lawyer | Economist/Public Servant |
|-------------|----------------------|---------------------------------|
| 1950 | 11 | 1 |
| 1960 | 8 | 4 |
| 1970 | 6 | 6 |
| 1979 | 5 | 7 |
| 1987 | 5 | 7 |
| 1995 | 3 | 9 |
| 2000 | 1 | 11 |
| 2010 | 2 | 10 |
| 2012 | 1 | 11 |

The background of the regional bank presidents is particularly interesting because unlike the Board staff who are selected by other staff for their prowess at data analysis, the regional bank presidents are selected by the regional bank directors who represent the local business community in each region. In many ways, this makes them the least likely to be selected based on academic qualifications and most likely to be selected based on business connections. Given that even these bank presidents have markedly shifted toward being trained economists, it is reasonable to assume that the directors of the regional banks deemed it necessary to have a technically trained bank president so that he might be able to understand the increasingly complex methods, models and data presented by Board staff at FOMC meetings.

Given this trend toward technocratic staff at both the Board and the regional bank level, the argument that regional bank president have a fundamentally different understanding of the economy than their counterparts at the Board is an unlikely explanation as to why regional bank presidents have more commonly dissented on FOMC votes throughout much of the Fed's history

¹¹⁷ This data was collected from each regional Fed bank's historical information.

(Chappell, Henry, et al).¹¹⁸ This suggests that either due to the selection process to be President of each region or via the predominant economic influences in that region (these two are not necessarily severable) these presidents view the economic data through a different lens than do Board members charged with seeking optimal policy for the entire nation. In particular, one might hypothesize that the views of regional bank presidents are influenced by significant industries in their region.

This hypothesis is tested using data from FOMC meeting minutes and Beige Book economic data from the 25 year period between 1987 and 2012. Specifically, data was drawn from the minutes of each meeting and the names of the dissenters were recorded as well as the rationale behind their dissents. The names were then connected to the Federal Reserve districts where the data was recorded from the Beige Books that corresponded to each dissent. For example, on March 12, 2012, Jeffrey Lacker of Richmond dissented because he believed that keeping the Federal Funds Rate low until 2014 was unwarranted. This information was crosschecked against the Richmond section of the Beige Book which noted that retail sales had risen sharply, port activity in Baltimore was strengthening, and real estate was strengthening. Those three industries, listed throughout the period from 1987-2012 as major industries in Richmond's section of the Beige Book, were showing signs of improvement. Lacker's dissent, in favor of keeping rates low until 2014, may have been influenced by the strength of Richmond's major industries.

Another example is Jerry Jordan's dissent in March of 1998. Jordan, the President of Cleveland Federal Reserve Bank, dissented because he believed that inflation was a growing

¹¹⁸ Chappell, Henry W., Rob Roy McGregor and Todd Vermilyea. *Committee Decisions on Monetary Policy*. The MIT Press: 2005.

problem and that price stability should be at the crux of that session’s monetary policy. The Beige Book for Cleveland showed that both retailers and transportation companies worried about inflation risks. In particular, the trucking industry had been growing increasingly competitive, and prices were very elastic; truckers worried that inflation would cause their real wages and profits to decrease. Jordan’s dissent appears to be closely linked to concerns expressed by these two industries voiced in the Beige Book data from his region. This process of linking dissents with the economic health of main industries was repeated with each dissenting vote resulting in the data presented in table 3.

Table 3: FOMC Voting Influence of Industry in Region

| Regional Bank District | Influenced Decision | Did not influence Decision | Total |
|-------------------------------|----------------------------|-----------------------------------|--------------|
| 1 | 1 | 0 | 1 |
| 2 | 0 | 0 | 0 |
| 3 | 3 | 2 | 5 |
| 4 | 12 | 4 | 16 |
| 5 | 13 | 4 | 17 |
| 6 | 0 | 1 | 1 |
| 7 | 3 | 0 | 3 |
| 8 | 7 | 3 | 10 |
| 9 | 5 | 1 | 6 |
| 10 | 13 | 1 | 14 |
| 11 | 12 | 1 | 13 |
| 12 | 2 | 1 | 3 |
| Total | 71 | 18 | 89 |
| Percentage | 79.80% | 20.20% | 100% |

As these results clearly demonstrate, nearly 80 percent of all dissents can be linked to the predominant industrial sectors in a dissenting regional bank president’s region. This lends further credence to the idea that although regional bank presidents do not dramatically differ from their

counterparts on the board in education or background, they do represent a substantively different constituency. Figure 1 breaks down the data by industry group to identify which industries drive the highest number of dissents.¹¹⁹

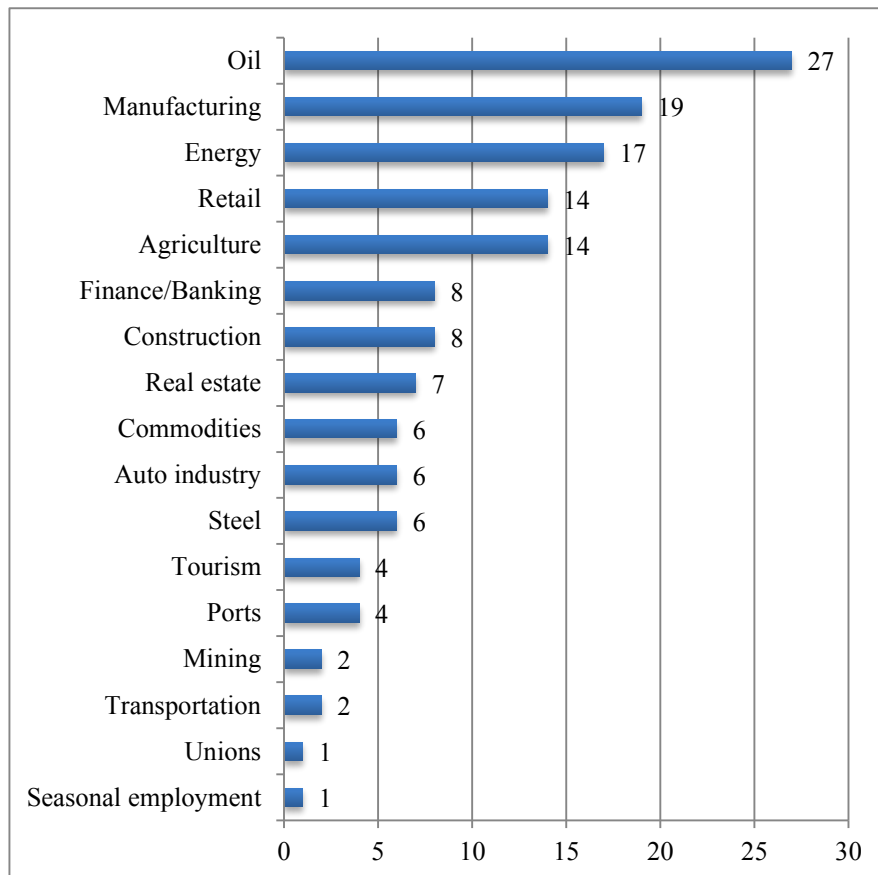


Figure 4: RBP Dissents Influenced By Industry

¹¹⁹For any one dissent, it was often possible to find more than one industry that contributed to the explanation for the dissent. The Beige Book identifies a set of strong industries in each region, but the next step is to discern the strongest industry among those given. Adding data from the Bureau of Labor Statistics, employment in each state by industry overwhelmingly shows manufacturing as the leading employer in every state with the exception of Hawaii (where retail is the largest employer). Retail comes in second in every other state. This data reflects two of the largest four industrial influences; however, energy and oil industries do not appear in the data. In fact, only 1.15% of Texans are employed in any oil-related jobs, while 8% of US GDP is devoted to energy consumption. Therefore the employment data on energy and oil does not adequately portray the huge influence it has as a revenue producer and a political force in the American economic and political spectrums.

While this data clearly indicates that prominent industries in each region affect voting by the regional bank president from that region, this data is probably not a good indicator of which industries possess the most power within the Fed because the most powerful industrial voices are unlikely to need to dissent. This helps explain why banking does not appear higher on the list of dissents. Moreover, the overwhelming majority (75%) of these dissents were in favor of tighter monetary policy due to concerns about price stability, while the remaining quarter of dissents were split between concerns about unemployment, foreign economic and currency factors, and a desire to hold policy steady due to time lags. This indicates that on average, regional bank presidents are also more hawkish than their counterparts on the Board. In fact, during the sample period 89 dissents were made by regional bank presidents while only 51 dissents were made by Board members. Since Board members comprise 58 percent of the FOMC (7/12ths) and regional bank presidents comprise only 42 percent of the FOMC (5/12ths) this means that a regional bank president was more than twice as likely as a Board member to dissent. Once again, this points to regional influences facing bank presidents that do not impact Board members.

5.3 Opaque Process

In addition to the growing staff of increasingly technically trained economists throughout the Federal Reserve System and the vast array of policy tools and regulatory responsibilities taken on by the Fed since the 1950s, the institution itself remains a bureaucratic black box. The policy process procedurally involves a complex mix of votes from regional bank presidents and Board members, but inputs to the proposed policies and the selection process of these voting members remains unclear to most outsiders. As the analysis above demonstrates, the informational inputs to a regional bank president's vote may vary from those inputs to a Board

member's vote, but both individuals also have the opportunity to convince the other at an FOMC meeting, even if the regional bank president is not voting that year. As confusing as these procedural steps are and as idiosyncratic as the personnel selection process is, the most complex part of Fed policymaking is the data.

Collected from a wide variety of sources and analyzed by both Board staff and regional bank staffs, the Fed's economic data is completely undecipherable to the vast majority of Americans. This means that any technical justification for a policy decision would be unintelligible to most casual observers and this confusion has forced the Fed to increase transparency in an effort to manage market expectations about Fed policy. However, it has also given the Fed an opportunity to slowly expose themselves to the world. Each step toward greater Fed transparency is hailed as a victory by good governance advocates and buys the Fed a bit more good will to avoid Congressional pressure to disclose more information. This mastery over slow disclosure has allowed the Fed to centralize authority, increase their technocratic capabilities and still operate autonomously through the 1980s, 1990s and 2000s.

6. Conclusion

Although the Federal Reserve System was founded as a network of regional banks designed to aggregate regional economic data and preferences in order to create optimal policy outcomes, in the second half of the 20th Century, without statutory or legislative impetus, the Fed centralized authority in the Federal Reserve Board. As power centralized in Washington and modern commuting sparked innovation in finance and economics, the Federal Reserve System, led by the Federal Reserve Board, made a concerted effort to modernize data gathering, research and policymaking by hiring increasingly technically inclined personnel. Centralization of Fed

power in Washington DC combined with policy made by technocrats relying on hard data as opposed to easier to understand anecdotal information made the Federal Reserve System increasingly opaque to casual observers. This opacity and suboptimal policy outcomes in the 1970s led to public backlash in the form of legislative oversight bills passed in 1977 and 1978. Further advances in technocracy in the 1980s and 1990s continued to make policy difficult for the public to understand, but savvy leadership allowed the Fed to self-impose transparency beginning in the 1990s, thereby avoiding direct oversight and maintaining efforts toward increasingly technocratic policymaking.

Although transparency has allowed the Fed to continue making policy based on technical or data-driven information, this does not mean that economic preferences do not cloud this data, especially the information coming from regional banks. Further, these institutional constraints designed to add a layer of representation to regional economic interests add to the confusing and opaque nature of the Fed's policymaking process. Nevertheless, in 1985 Paul Volcker explained his support for the structure of the Federal Reserve System:

...the structure of the system undoubtedly looks like the proverbial camel, designed by committee. It combines a central supervisory and coordinating body in Washington -- the Federal Reserve Board — with twelve regional banks whose Presidents participate directly in decisions on monetary policy. The Banks also have knowledgeable private citizens, drawn from various walks of life, on their boards of directors; they participate in the regional administrative management and provide a flow of information about the economy and policy proposals even if they are shielded from monetary policy responsibility (and even advance knowledge of key decisions). Obviously, there can be stresses and strains internally -- they are a by-product of the effort to assure a variety of points of view. But I would also submit that, like a camel, it works – and works effectively against those tests of competence, continuity and responsiveness (Volcker, 18)¹²⁰.

¹²⁰ Volcker, Paul A. "1984 Cosmos Club Award Remarks." 3 May 1984, Page 18.

However, examined in earlier sections, the preservation of this bureaucratic system has come at the cost of increased Fed transparency. In that very same speech Volcker expresses grave reservations about the impact of that transparency:

Sunshine may at times be a healthy and essential antidote to festering sores. But, carried to excess, I have seen it wilt some tender plants that need quiet cultivation. Sometimes, when legitimate efforts to reach reconciliation will be interpreted as public defeat or "selling out," it seems to have the practical effect of simply hardening antagonistic positions (Volcker, 10)¹²¹

Volcker's point has proven true in other areas of government where compromise has become increasingly difficult without politicians giving the appearance that they "sold out." Thus far the Fed has remained largely insulated from such political pressures, but much of the media and certain political groups have been increasingly quick to accuse the Fed of pandering to constituents in the banking community. While these attacks have remained at an arm's length from policy, the Fed's persistent and seemingly path dependent march toward transparency as a means of guarding against backlash to centralization and increasing technocracy will need to slow or halt at some point prior to the Fed disclosing so much that they are affected by political backlash and suffer a decline in reputational legitimacy that ultimately infringes on Fed independence.

¹²¹ Volcker, Paul A. "1984 Cosmos Club Award Remarks." 3 May 1984, Page 10.

How the Fed Moves Markets:

Equity and Bond Market Reactions to Federal Reserve Communications

ABSTRACT

For decades the financial news media has been hyper-focused on public communications by Federal Reserve officials. The implication of this media coverage is often that Fed communications heavily influence market behavior. This paper seeks to test that assumption by examining every speech, Congressional testimony, press release and FOMC minutes release made publicly available by the Federal Reserve Board in order to observe Treasury bond market and equity market responses to these transparency measures; the equity market analysis is particularly emphasized. Findings indicate that volatility is little changed as a result of most of these Fed communications. This suggests that despite media hype, investors draw minimal useful information from most individual Fed communications and largely treat these communiques as noise or “cheap talk.” These findings provide insights on how bureaucracies utilize communication and transparency measures to control the flow of information about policymaking at their institution. These findings also lead to an alternative means of analysis of Fed communication involving quantitative analysis of the content of all Fed communications in concert, rather than qualitative analysis of individual communications. This alternative analysis identifies the broad signals provided by modern Fed transparency measures and clarifies how this quantitative approach to qualitative communications might be useful in gauging market response.

1. Introduction

After achieving independence from the Treasury in the early 1950s, the Federal Reserve rapidly centralized policy at the Federal Reserve Board in Washington D.C. By the late 1970s and early 1980s the instruments of monetary policy in a globally integrated economy became increasingly complex and technocratic; this caused pressure to mount for increased central bank transparency. In the U.S., the media pressure for transparency had become so prominent that major newspapers and television networks began what was known as “the briefcase watch;” every six weeks reporters would follow Fed Chairman Alan Greenspan the morning of an FOMC meeting to get a glimpse of his briefcase. The thinking was that if the case was thick, then Chairman Greenspan had been reviewing data and therefore there would be a rate change. If the briefcase was thin, rates would remain the same. Obviously this was not a precise science, but this type of media coverage demonstrated that sufficient pressure was building for Fed transparency and if Fed officials did not create their own measures to provide information to the public, they might soon have to face a legislative mandate toward less favorable transparency measures.

Although initially designed to be representative of the American people and American business interests, by the 1990s the Fed regions had grown exceedingly unrepresentative of the nation’s population.¹²² Further, the complex class A, B, and C board member procedure for selection of regional bank Presidents¹²³ kept the process at arm’s length from an increasingly

¹²² Over 1/5th of the U.S. population lives in the 12th Federal Reserve district located in San Francisco, but that district has the same voting power as any other, and less than New York.

¹²³ <http://www.frbsf.org/federalreserve/people/officers/roles.html>

information-hungry public. Compounding the problem was opaqueness of the increased role of appointed staff at the Federal Reserve Board and the technical nature of modern monetary policy. Essentially, by the 1990s, the Fed had let technocracy supplant public representation, but as the briefcase watch highlights, the public was starving for information. So, Fed personnel moved toward transparency to alleviate pressure from the public and head off pressure from Congress.

In 1994 the Fed began new transparency measures by releasing statements regarding changes to the overnight Fed Funds Rate. By 1998, these press releases were being issued at the conclusion of each FOMC meeting, even if rates remained unchanged (Cross and Pashel).¹²⁴ These measures allowed the Fed to join central banks around the world in pursuing new communication measures that align with a rational expectations philosophy based partly on the idea that managing expectations about economic performance helps minimize market shocks (A History of Central Banking in the United States).¹²⁵

This account of the Fed's adoption of communication measures is not intended to suggest that transparency is equivalent to representation, but increased information did alter the public view of the Fed, particularly the Fed Chairman,¹²⁶ and the news media latched onto the storyline that Fed communications impact markets. Academic and private sector studies have been able to support this popular press attention by demonstrating links between Fed communications and

¹²⁴ Cross, Gary and Jan Paschal. "Timeline: Federal Reserve's Transparency Steps." Reuters. 25 January 2012. <http://www.reuters.com/article/2012/01/25/us-usa-fed-communications-idUSTRE80O2QQ2012012>

¹²⁵ A History of Central Banking in the United States.

¹²⁶ Numerous studies indicate that the prior to Fed transparency the perception was that the Fed Chairman was something of a dictator. Since transparency measures have been instituted anecdotal evidence suggests that the Chairman is now perceived as more of a consensus builder. This may be impacted by the individual Chairman and their personalities, but the link to transparency should not be ignored.

fluctuations in the Treasury bond yields (Section 2).¹²⁷ However, the studies linking Fed communications to Treasury bond yields have been limited and studies linking equity market movements to Fed communications have been even less thorough. It is the goal of this paper to examine the links between Fed transparency measures and market response, particularly equity market response.

In addition to examining the impact of communications broadly, market responses to different types of Federal Reserve communications are examined individually. In particular, the main modes of communication by the FOMC, the Fed's main monetary policy making body, are press releases immediately after FOMC meetings, minutes releases three weeks after FOMC meetings, and transcript releases six years after the meeting. Due to the enormous time delay limiting any possibility of market response, transcripts will not be analyzed in this paper. Beyond these communications, the Fed also issues general statements typically pertaining to regulatory action, but since these communications have only become common since 2007, they are not part of the primary analysis (Meltzer).¹²⁸ Fed officials also regularly give public speeches, and beginning in April 2011, the Chairman has held a press conference after select FOMC meetings (Appendix 4).¹²⁹

Less direct modes of Fed communication are also examined. Specifically, Fed officials testify before Congressional committees regularly, in accordance with the 1978 Humphrey-Hawkins legislation dictating that the Chairman must testify before both the House and Senate at least twice a year. In addition to these testimonies, Fed Board members are regularly called to

¹²⁷ One such study by scholars at Macroeconomic Advisers LLC is discussed in Section 2.

¹²⁸ A brief analysis of these communications can be found in Appendix 5.

¹²⁹ Due to the incredibly small sample of these press conferences at the time of writing, a full analysis of the market reaction to them is not provided.

testify before House committees, Senate committees or the Congressional Joint Economic Committee. Since the Senate has confirmation power over Fed Board nominees and the House has no comparable power, one might expect that Senate testimony is given more weight due to the fact that many board members, especially the Chairman, might be seeking reappointment.¹³⁰ Anecdotal evidence suggests the contrary; Fed Board members grant more weight to House testimony (Gramley).¹³¹ This paper will examine how the market weights these different types of communication and if testimony before one chamber has more sway over market actors.

The fundamental goal of this paper is to examine whether markets perceive Fed communication as a form of bureaucratic cheap talk or as a signaling mechanism. More precisely, the goal is to determine if the market believes certain communications to be cheap talk and other communications to be credible signals. In examining these communications as cheap talk or as signals, this paper will rely on definitions of these terms primarily from game theory, but also drawing on specifications established in the contract theory literature. In game theory cheap talk is essentially defined as communication that does not affect the outcome of the game (Farrell and Rabin).¹³² Extrapolating this to monetary policy communications means that the cheap talk is chatter to feed the news cycle, but it does not provide credible information about future monetary policy actions. This contrasts with signaling which is defined as conveying credible information that can impact the outcome of the game (Spence).¹³³ Signaling is often

¹³⁰ Members serve a single 14-year term, but many do not serve the full term and those appointed to replace them can serve out the remainder of a term and a complete 14-year term. The Chairman must be appointed and confirmed every 4 years.

¹³¹ Gramley, Lyle. Telephone Interview. March 2012

¹³² Farrell, Joseph, and Matthew Rabin. "Cheap Talk." *The Journal of Economic Perspectives*. no. 3 (1996): pp. 103-118.

¹³³ Spence, Michael. "Signaling in Retrospect and the Informational Structure of Markets ." *The American Economic Review*. no. 92 : pp.434-459.

assumed to be costly, but since the Fed provides communication regardless of whether they are providing cheap talk or credible signals, the costs of signaling are minimal and some measure of credible signaling is necessary to ensure that market actors maintain faith in Fed communications. The Fed may also overtly seek to over-saturate the market with their communications in an effort to drown out credible signals and minimize dramatic market swings in response to Fed communications.

It is also worth note that Fed personnel have repeatedly implied that they believe at least one form of communication, FOMC meeting press releases, to be a signaling mechanism that elicits market reaction. Specifically, on October 11, 2012 Fed Board Governor Jeremy Stein declared:

I believe that the LSAP component of the statement helped bolster the credibility of the forward guidance component by pairing a declaration about future intentions with an immediate and concrete set of actions. And I suspect that this complementarity helps explain the strong positive reaction of the stock market to the release of the statement. In addition to this signaling channel (Stein)¹³⁴

However, as an academic economist, Jeremy Stein published a paper titled “Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements.” In this paper Stein develops a theory whereby the Fed uses policy announcements to “manipulate expectations” and only conveys “...some information about its goals through the ‘cheap talk’ mechanism...” (Stein)¹³⁵ This conflict between Stein’s academic work dubbing Fed policy announcements as “cheap talk” and Stein’s work as a member of the Federal Reserve Board indicating that the Fed is sending credible policy signals highlights the institutional need to maintain the public perception that all

¹³⁴ Stein, Jeremy. “Evaluating Large Scale Asset Purchases”

¹³⁵ Stein, Jeremy C. “Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements.” *The American Economic Review*. No. 79: pp. 32-42

Fed signals are credible. This paper tests whether the market responds as if this truly is the case, or if some Fed communications are merely cheap talk.

In examining Fed communications, this paper first tests whether Fed communications generally impact Treasury bond and equity market volatility, then each type of communication is tested to see which has a greater impact on equity market volatility. Findings suggest that Treasury bond market volatility and equity market volatility are not significantly increased by Fed communications broadly, but among the individual types of communication findings suggest that certain press releases, minutes releases and some speeches do slightly increase equity market volatility. This implies that as a result of modern transparency measures creating a constant stream of Fed communication, market actors glean very little relevant information from most individual communications and generally treat them as a form of cheap talk, only latching onto certain words or phrases in a small subset of communications; this method is inefficient and provides incomplete information. Moreover, this method identifies a clear indication that certain communications are outliers eliciting market reaction, while most communications yield no such market movement. Additional testing suggests that when small amounts of information in each communication are added together, they can provide broader credible insight into Fed policy than qualitatively seeking outlier communications.

The paper proceeds by examining the existing body of work pertaining to Fed communication, then the communication data is broadly evaluated before individual types of communication are analyzed and discussed. Prior to concluding, an alternative way to view Fed communication is presented to more systematically evaluate Fed communications for institutional, policy and market information.

2. Contribution to the Literature

As a semi-private entity not housed in any branch of the federal government and self-reliant for funding,¹³⁶ the Fed remains relatively autonomous from political pressures. In theory, this might make Fed communications more credible to market actors. However, in order to ensure continued autonomy from increased government oversight the Fed has established myriad communication and transparency measures. Despite (or possibly because of) these transparency measures, since the “briefcase watch” Fed watching has only become more intense. As the Fed has released more information and officials have spoken more regularly, reporters, forecasters and financial analysts have increased efforts to parse the Fed’s communications to glean some indication about future policy steps. The consistent belief amongst these Fed watchers is that the information conveyed by Fed officials provides a credible signal about future policy. This belief remains despite the fact that Fed officials have been known to develop their own linguistic style to hide information; this language is known as “Fed Speak.”

Despite the prominence of noncommittal language in Fed Speak, Macroeconomic Advisers LLC, a private sector macroeconomic forecasting firm headed by former Fed Board member Lawrence Meyer, have consistently demonstrated that Fed communications directly influence Treasury bond markets. Each year Dr. Meyer and Antulio Bomfim release a paper evaluating the public statements made by Fed Board members and Presidents of the regional Federal Reserve Banks in the preceding year. They examine whose speeches had the most impact on bond markets, who gave the most speeches impacting bond markets, and whose speeches caused bond markets to swing in one particular direction or both up and down. As

¹³⁶ The Fed utilizes profits from open market operations to fund its operating budget; excess profit is turned over to the Treasury.

Table 1 demonstrates, they focus their efforts on examining speeches because their research shows speeches consistently moving bond markets more than all other Fed communications combined. However, this data does not control for the total number of speeches given, which greatly exceeds the more monetary policy directive FOMC statements and Press Releases. Moreover, this data relies on controls for the monetary policy actions taken. Absent the actual policy change, the authors still find bond market movement as a result of FOMC statements (press releases) explaining what policy the Fed intends to pursue is second only to speeches in their market impact.

Table 4: **Reprint of Table 1 From Meyer and Bomfim 2012**
Cumulative Absolute Change in Two-Year Treasury Yield
By Type of FOMC Communications (in basis points)(Meyer and Bomfim, 2012)¹³⁷

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|----------------------------------|------|------|------|------|------|------|------|
| FOMC Statement | 29 | 29 | 53 | 60 | 43 | 15 | 25 |
| Monetary Policy Testimony | 9 | 15 | 11 | 7 | 12 | 4 | 3 |
| FOMC Minutes | 30 | 28 | 19 | 13 | 13 | 11 | 6 |
| Speeches | 234 | 143 | 207 | 275 | 223 | 280 | 77 |

While the analysis by Macroeconomic Advisers demonstrates that Fed communications impact bond markets, analysis provided in the next section finds the effect of Fed communications on Treasury bond markets to be far less substantial. Moreover, existing examinations of equity market responses to Fed communications have been even less definitive. In attempting to discern market reaction to Fed announcements, several scholars have noted that estimating the response of equity prices to monetary policy actions is complicated by the fact

¹³⁷ Meyer, Lawrence and Antulio Bomfim. “*Monetary Policy Insights: Fixed Income Focus. Who Moved Markets in 2011?*” Macroeconomic Advisers LLC. January 2012.

that the market is unlikely to respond to policy actions that were already anticipated. Bernanke and Kuttner analyze the impact of monetary policy changes on broad stock indices and determine that a 25 basis-point cut is associated with a one percent increase in broad stock indices.

Goukasian and Whitney go one step further and develop a surprise index basing the expected rate on the Fast Fourier Transformation (FFT) rate and measuring the difference after a FOMC announcement to identify how much anticipation is priced into the market ahead of time. They find that the market is slow to react, but with the advent of modern rapid trading technology these findings are significantly dated. Both of these studies focus not just on Fed communication but on actual changes (or lack of changes) in Fed policy. Neither paper addresses whether equity markets respond differently to different types of Fed communication, regardless of whether or not that communication alters or confirms policy.

Despite lack of decisive information about the influence of policy announcements on equity markets, the financial news media is convinced that Fed communications impact the stock market, regardless of what other news might also be influencing the market that day. In particular, on the day of any major speech, testimony or FOMC release, financial media sources like CNBC and Bloomberg have constant coverage of the Fed. The Wall Street Journal has even taken to live-blogging Congressional Testimony by Fed officials to boil down the material into tidbits that might impact markets in real time¹³⁸ The Macroeconomic Advisers data demonstrates that as the Fed has become more transparent and as these communications have become more regular, policy uncertainty is reduced which has “diminished the ‘news’ component in FOMC communications (Meyer and Bonfim, 2012).”¹³⁹ Essentially, the market has better information,

¹³⁸ Often through text analysis algorithms that buy and sell based on written news items

¹³⁹ Meyer, Lawrence and Antulio Bomfim. “*Monetary Policy Insights: Fixed Income Focus. Who Moved Markets in 2011?*” Macroeconomic Advisers LLC. January 2012.

so the Fed is unlikely to surprise them and the policy could be “baked-in” to market pricing. If this is the case, it does not explain why media sources continue to act as though Fed communications deeply impact markets, especially equity markets. Given this question about market information and lack of policy surprise, it is more essential than ever to evaluate what, if any, impact different types of Fed communications have on markets.

3. Fed Communication Data

In order to examine the impact of Fed communications on markets a completely original dataset was constructed utilizing the timing of the Fed’s shift to transparency; the data begins in June of 1996. This 1996-2012 data includes every FOMC press release and minutes release as well as every speech and testimony before Congress given by a member of the Board of Governors.¹⁴⁰ For each observation, data was gathered on the volatility of various maturities of Treasury bonds and the Standard and Poors 500 that day.

Two decisions were made in coding this data, the first had to do with the timeframe of market reaction and the second had to do with the direction or type of market reaction. Although financial analysis often looks at several minute intervals to examine market reaction, the nature of publicly released Fed communications did not lend itself to this type of precise examination. Some communications were issued in the early morning before markets opened and many others were at various other points in the day. Moreover, some of these communications are very brief

¹⁴⁰ Due to the method of centralizing data at the Federal Reserve, only FRB members are examined, not regional bank presidents.

while others are very long, so the market reaction timeframe is not consistent. This led to the determination that if the market is to respond, it is likely to do so within the trading day, but not consistently within a shorter period of analysis. Adding an additional day after an announcement could pick up a more complete market reaction, but it also gathers a great deal of additional market noise from other economic issues and even other Fed communications on a different day. So, it was determined that for each observation of a Fed communication, the timeframe of market analysis would be that trading day.

Regarding the direction of analysis, this data does examine if Treasury markets respond directionally (up or down), but the data gathered does not determine if Fed communications cause equity markets to rise or fall based on certain types of communications.

3.1 Treasury Bond Market Analysis

The Treasury bond market analysis examines not just the magnitude of directional change among different types of Fed communications, but also changes in Treasury market volatility as measured by the absolute value of change in bond pricing from the previous day to the day of the Fed communication. This volatility measure is examined collectively and broken down by the Chairman's communications and communications from other Fed Board members. Table 2 examines the directional effect of different types of Fed communications on Treasury bond markets. These different types of communications include:

1. *Press releases* are the briefest documents, typically ranging from one to five paragraphs; these releases provide the essential policy information decided upon at an FOMC meeting and are released immediately after the meeting. This means that press releases are issued at least 8 times each year.

2. *Minutes releases* also occur after each FOMC meeting, but with a three week delay.

These minutes provide information about the presentations and deliberations at an FOMC meeting without providing precise quotations or attributing statements to particular individuals.

3. *Speeches* vary dramatically in length and occur with irregular frequency based on invitations for Board members to speak at conferences, think tanks and other venues. Due to demand, the Chairman typically speaks more regularly than any other member of the Board.

4. *Congressional testimony* can also vary in length, but does occur with some steady frequency since the Chairman is called before Congress twice each year as a result of the Humphrey-Hawkins legislation in 1978. Board members, especially the Chairman, are typically called before Congressional committees more regularly than just the Humphrey-Hawkins testimony and testimony is more often regarding regulatory issues than monetary policy decisions, although this varies somewhat by chamber. It is also worth note that due to certain conventions House hearings are more contentious and likely to venture into monetary policy while Senate hearings are typically more staid and respect the boundaries of an independent central bank.

These types of communication differ dramatically in frequency, format, structure and content, but they all have strengths and weaknesses when it comes to signaling markets, which is why it is essential to quantitatively examine how the market responds differently to each type of communication.

Table 5: Treasury Market Movements

| | 3 Month | 6 Month | 1 Year | 2 Year | 3 Year | 5 Year | 7 Year | 10 Year | 20 Year |
|-----------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Overall | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> |
| Speeches | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| House | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Senate | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Press | -0.02 | -0.02 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Minutes | -0.01 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average | <i>-0.01</i> | <i>-0.01</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> |

The “Overall” line in Table 2 looks at the average rise and fall of Treasury bond markets on an average day in the period between 1996 and 2012. As expected, on average increases and decreases cancel each other out. Looking at the Treasury market data on the days of different types of Fed communications, findings indicate that no type of communication averages moving markets more than 2 basis points (0.02%) in any particular direction (up or down) on a given day. Moreover, the “Average” line demonstrates that the average movement of particular maturities of Treasury bonds in response to all different types of Fed communications is 0 basis points (0.00%) in all but the 3 and 6 month bonds which average a movement of just 1 basis point (0.01%).

Table 3 demonstrates that no type of Fed communication ever produces an average increase or decrease in volatility (as measured by the absolute value of the change in Treasury market prices on the day of the communication) of more than 2 basis points (0.02%) above the “Overall” average volatility for that duration bond during the sample period. This means that the “Average” bond market response to all types of Fed communications does not elevate volatility above the “Overall” market average by more than 1 basis point (0.01%) on an average day.

Table 6: Treasury Market Average Volatility

| | 3 Month | 6 Month | 1 Year | 2 Year | 3 Year | 5 Year | 7 Year | 10 Year | 20 Year |
|-----------------|------------|------------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| Overall | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Speeches | 0.03 | 0.03 | 0.03 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| House | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.06 | 0.06 | 0.06 | 0.05 |
| Senate | 0.02 | 0.02 | 0.03 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.05 |
| Press | 0.04 | 0.04 | 0.04 | 0.06 | 0.06 | 0.07 | 0.06 | 0.06 | 0.05 |
| Minutes | 0.03 | 0.02 | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Average | 0.03 | 0.03 | 0.03 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.05 |

In breaking the volatility data down by who is communicating, the Chairman or another member of the Board, findings suggest that the Chairman does not create a significant change in volatility that differs from the volatility impact of communications by other members of the Federal Reserve Board (Appendix 1).¹⁴¹ This minimal finding coupled with the negligible increase in Treasury market volatility (both directional and absolute) caused by Fed communications indicates that Meyer and Bomfim overstate the effect of Fed communications on bond markets by only examining all communications over the course of a year in concert, rather than breaking down their numbers to examine the market effect of communications on a daily basis. The lack of changes in average daily Treasury market movements caused by Fed communications does not indicate a lack of effect of these communications on Treasury bond markets entirely, but rather a lack of effect on an average trading day. However, outliers still exist in the data and it is worth note that they may be substantively important since certain individual communications are more important market drivers than others.

¹⁴¹ See Figures 1 and 2 in Appendix 2

3.2 Equity Market Analysis

Unlike the examination of Treasury markets, the examination of equity markets does not examine the directionality of market response to the Fed communications; the analysis is focused on whether or not the market reacts at all. To do this, several different equity market volatility measures were examined; the absolute open-to-close return and the high-to-low spread (Section 4).¹⁴² The absolute open-to-close return is a measure of the magnitude of the market's reaction on a given day from market open to market close. The high-to-low spread is a measure of the magnitude of the market's reaction on a given day from its highest point to its lowest point. As an additional measure of volatility, trading volume was also examined after being normalized based on the general rise in volume due to technological advances. Ultimately, these volatility measures indicate whether the market responded in any direction (up or down) to Fed communications. This data provides a foundation for future work determining the direction and magnitude of these responses based on the content of Fed communications and the direction of equity market responses.

While the primary period of analysis is 1996-2012, broader equity market reference data was gathered on speeches and testimony from 1962-1996. Since this period predates modern Fed transparency measures, press releases and minutes releases were infrequent, irregular and could not be catalogued. Despite this lack of completeness, the 1962-1996 data does provide a greater historical record on the impact of Fed communication in the period predating modern transparency measures and whatever “noise” they create. This data is also coded to examine the difference between speeches or testimony given by the Chairman and another member of the Board. Examining the data from this earlier period serves as both a robustness check on the

¹⁴² These figures were logged for analysis in Section 4.

shorter, modern dataset and as reference point to examine if the plethora of modern communication has diluted the impact of individual Fed transparency measures.

Table 7: Average Volatility 1962-1996

| | Spread | % Change Spread | Return | % Change Return | Volume | % Change Volume | Average % Change |
|------------------|--------|-----------------------|--------|-----------------------|----------|-----------------------|------------------------|
| Overall | 2.30 | | 1.09 | | 86922592 | | |
| Testimony | 2.36 | 2.61% | 1.03 | 5.50% | 96653636 | 11.20% | 6.44% |
| Speeches | 2.28 | 0.87% | 1.02 | 6.42% | 85100477 | 2.10% | 3.13% |

Table 4 reviews two commonly known Fed transparency measures for the period from 1962-1996 comparing them to the “overall” average daily market movements from that period. Table 5 presents a more comprehensive set of raw Fed communication data from 1996-2012. This data is broken down by type of communication and subsequent analysis in Section 4 examines each different type of communication individually.

Table 8: Average Volatility 1996-2012

| | Spread | % Change Spread | Return | % Change Return | Volume | % Change Volume | Average % Change |
|-----------------|--------|-----------------------|--------|-----------------------|------------|-----------------------|------------------------|
| Overall | 17.13 | | 10.01 | | 2356636051 | | |
| Press | 22.10 | 29.01% | 12.78 | 27.67% | 2913944270 | 23.65% | 26.78% |
| House | 18.70 | 9.17% | 10.98 | 9.69% | 2603635107 | 10.48% | 9.78% |
| Minutes | 16.88 | 1.46% | 9.99 | 0.20% | 2675886632 | 13.55% | 5.07% |
| Senate | 17.23 | 0.58% | 9.90 | 1.10% | 2478725756 | 5.18% | 2.29% |
| Speeches | 17.32 | 1.11% | 10.11 | 0.99% | 2322714141 | 1.44% | 1.18% |

Table 5 identifies that all Fed communications increase volatility and on average, press releases generate the most overall change on the three different volatility measures. In descending order of impact on volatility we can see House testimony, minutes releases, Senate testimony and speeches. Although these figures indicate substantial average percentage increases in market volatility, none of these findings are statistically significant. Due to skewed data that is

common in evaluating financial markets, these distributions violate normality since a small subset of outliers drive the large percentages in the descriptive statistics. While these outliers are not a focus of this analysis, a less systematic analysis could use such days to cherry-pick data that confirms the Fed's role in driving markets. That is not to say that these outliers are irrelevant, they do provide a crucial demonstration of the power of Fed communication, it is to say that they do not provide a complete picture of how the Fed impacts markets through regular communications.

Since Table 5 demonstrates that markets are not significantly moved by communications on average, but outliers (fat tails) drive the change figures, Section 4 provides more comprehensive analysis examining the statistical significance of the impact of each form communication on financial markets. In addition to coding for different types of communication, each communication was coded to identify if the speaker was the Chairman or another member of the Board. Since the Chairman has a much higher public profile, the expectation is that he might move markets more than other members. This analysis applies only to speeches and testimony, which are attributed to an individual, not to press releases or minutes releases which are generally attributed to the Board or the FOMC.

Congressional testimony is broken down by the chamber in which it took place and measures were also taken to account for identical testimony being given on different days to both chambers. Breaking the testimony down by chamber made it possible to examine whether the market responds more to testimony before one chamber or the other. Theoretically, the market might see Fed Board members as more beholden to the Senate that confirms them than the House that has no direct oversight. Anecdotal evidence from Fed officials suggests that this is not how they perceive these testimonies; if anything, Fed officials indicate that the House hearings are

more contentious and require more preparation (Axelrod Interview). ¹⁴³ This suggests that the House is making up for its lack of confirmation power with tougher hearings as a method of oversight or an attempt to drive policy. Moreover, the House is known to have a lower degree of decorum, so it is not unreasonable to assume that House members might be more willing to infringe on central bank independence as a means for garnering press attention. Since the testimony data has been split by chamber, it is possible to examine how the equity market perceives these hearings and if market actors respond more to testimony before one chamber or the other.

Although it would be ideal to have a complete catalogue of the content of every Fed communication and the minute-by-minute reaction of markets to these communications, the data compiled here provides a foundation on which to examine how the markets reacts to communications broadly and if markets react differentially to different types of Fed communication. Moreover, initial examinations of this data indicate that the Fed may be deliberately saturating markets with communications to manage expectations in hopes of limiting or controlling market swings based on individual Fed communiques.

4. Analysis of Different Forms of Communication

Having established that Fed communications generally do not significantly impact equity markets, but some outlier communications do impact markets, this section tests individual types of communications. Upon initial examination of the data it is obvious that the distributions of

¹⁴³ Axelrod Interview, 23 November 2011

market volatility violate normality. To deal with this problem, log returns were used to examine the open-to-close and high-to-low market data. As appendices 2 and 3 demonstrate, these transformations were not sufficient to overcome violations in the assumption of normality, therefore regression and time series analysis was not conducted on this data. Instead, Kolmogorov Smirnov (KS) and Anderson-Darling (AD) tests were conducted on open-to-close and high-to-low as measures of volatility as well as distributions of trading volume as a more sensitive volatility measure. The analysis has generated four distinct hypotheses that will be tested:

1. *Communications by Chairman elicit a greater equity market response than communications by other members of the Board of Governors.*
2. *Equity markets react more to speeches than to testimony by Fed officials.*
3. *Equity markets react more to House testimony than Senate testimony.*
4. *Equity markets react more to press releases than any other type of communication.*

Each of these hypotheses will first be addressed utilizing the open-to-close (return) and high-to-low (spread) measures of volatility. This will be followed by a separate analysis utilizing the more sensitive volatility measure, trading volume. The volume tests also include comparative analysis from the 1962-1996 period.

4.1 Open-to-Close and High-to-Low Volatility Tests

1. *Communications by Chairman elicit a greater equity market response than communications by other members of the Board of Governors.*

Kolmogorov Smirnov (KS) and Anderson-Darling (AD) tests were conducted to assess if the distributions of the log-return of volatility when a chairman spoke and when other members

spoke were significantly different. The results of the KS test were not significant, $p = .247$, suggesting that the distribution of the log-return of volatility was not significantly different when the chairman spoke and when the other members spoke. However, there were ties in the KS test, and thus the AD test was also conducted. The results for the AD test, adjusting for ties, was also not significant, $p = .167$. Therefore, it can be concluded that the distributions of the log-return were not different when the chairman spoke and when the other members spoke.

A KS test was also conducted to assess if the distributions of the log-spread of volatility when a chairman spoke and when other members spoke were significantly different. The results of the KS test were not significant, $p = .874$, suggesting that the distribution of the log-spread of volatility was not significantly different when the chairman spoke and when the other members spoke. However, there were ties in the KS test, and thus the AD test was also conducted. The results for the AD test, adjusting for ties, was also not significant, $p = .535$. Therefore, it can be concluded that the distributions of the log-spread were not different when the chairman spoke and when the other members spoke.

2. *Equity markets react more to speeches than to testimony by Fed officials.*

Kolmogorov Smirnov and Anderson-Darling tests were conducted to compare the conditioned volatility distributions of the log-returns for speeches and testimonies. The results of the KS test was not significant, $p = .065$, which suggests that there was no difference in the conditioned volatility distributions for speeches compared to testimonies. However, there were ties in the KS test, and thus the AD test was also conducted. The results for the AD test, adjusting for ties, was also not significant, $p = .086$. Therefore, the conditioned volatility distributions for the log-returns were not different for speeches and testimonies.

3. Equity markets react more to House testimony than Senate testimony.

Kolmogorov Smirnov and Anderson Darling tests were conducted comparing the log-returns for a testimony before the House and Senate. The results of the KS tests were not significant, $p = .860$, which suggests there was no difference in the distribution of log-returns for the House and the Senate. However, there were ties in the KS test, and thus the AD test was also conducted. The results for the AD test, adjusting for ties, was also not significant, $p = .558$. Therefore, it can be concluded that the conditioned volatility distributions for the log-returns were not different for testimony before the House and the Senate.

4. Equity markets react more to press releases than any other type of communication.

Kolmogorov Smirnov tests were conducted to compare press releases and minutes releases on their log-return distributions. Press releases and minutes releases were compared and were not significantly different, $p = .627$, suggesting no difference between the distributions of log-returns of press releases and minutes releases. An Anderson Darling test was also conducted to compare the press releases and minutes releases on their log-return distributions and they were not significantly different, $p = .271$, suggesting no difference between the distributions of log-returns of press releases and minutes releases. Essentially, the distribution of press releases had a fatter tail while the distribution of minutes releases had a higher peak; (Appendix 5) ¹⁴⁴ this indicates that the Press releases more consistently impacted volatility, but in a few instances the impact of minutes was more extreme.

¹⁴⁴ See Figure 1 in Appendix 6.

Four additional Kolmogorov Smirnov and Anderson Darling tests were conducted to assess if there were differences between the distributions of the log-return for press releases, minutes releases, speeches and testimonies. Four total pairs of distributions were compiled. Because there were Four tests conducted, the level of significance was set to .013 (.050/4).

The results of the first KS test compared the distribution of press releases and speeches; the result was not significant, $p = .100$. The second KS test compared the distribution of press releases to testimonies; the KS test was also not significant, $p = .853$. The third KS test compared the minutes releases with speeches; the results were still not significant, $p = .859$. The fourth KS test compared the minutes releases with testimonies and was still not significant, $p = .630$.

Anderson-Darling tests were also conducted and the results of the first AD test compared the distribution for press releases and speeches; the result was not significant, $p = .070$. The second AD test compared the distribution of press releases to testimonies; the AD test was also not significant, $p = .403$. The third AD test compared the minutes releases with speeches; the results were still not significant, $p = .400$. The fourth AD test compared the minutes releases with testimonies and was still not significant, $p = .526$. Essentially, the log-return peaks higher for days with speeches, but has a larger tail for days that press releases were issued (Appendix 5).¹⁴⁵

¹⁴⁵ See Figure 2 in Appendix 6.

Table 9: Summary of Results of Difference in Distributions for High-to-Low (Spread) and Open to-Close (Return)

| Distribution 1 | Distribution 2 | KS <i>p-value</i> | AD <i>p-value</i> |
|------------------------------|----------------------|-------------------|-------------------|
| Chairman (log-return) | Members (log-return) | .247 | .167 |
| Chairman (log-spread) | Members (log-spread) | .874 | .535 |
| Speeches | Testimony | .065 | .086 |
| House Testimony | Senate Testimony | .860 | .558 |
| Press Release | Minutes Release | .627 | .271 |
| Press Release | Speeches | .100 | .070 |
| Press Release | Testimony | .853 | .403 |
| Minutes Release | Speeches | .859 | .400 |
| Minutes Release | Testimony | .630 | .526 |

4.2 Trading Volume Volatility Tests

1. Communications by Chairman elicit a greater equity market response than communications by other members of the Board of Governors.

Kolmogorov Smirnov (KS) and Anderson-Darling (AD) tests were conducted to assess if the distributions of the volume when a chairman spoke and when other members spoke were significantly different. The results of the KS test were not significant, $p = .708$, suggesting that the distribution of the volume was not significantly different when the chairman spoke and when the other members spoke. However, there were ties in the KS test, and thus the AD test was also conducted. The results for the AD test adjusting for ties was also not significant, $p = .527$. Therefore, the data suggests that the distributions of volume were not different when the chairman spoke and when the other members of the board spoke.

Additional KS and AD tests were examining the data from 1962 to 1996 to see if it behaves differently than the 1996-2012 data. The results of the KS test were significant, $p < .001$, suggesting that there were differences in the volume distributions when a chairman spoke and

when a Board member spoke. There were ties in the KS test and thus the AD test was also conducted. The results of the AD test were also significant, $p < .001$. This suggests that in the earlier period, before increased Fed transparency, the Chairman's words carried more weight than those of other members of the Board.

2. *Equity markets react more to speeches than to testimony by Fed officials.*

Kolmogorov Smirnov and Anderson-Darling tests were conducted to compare the distributions of the volume for speeches and testimonies. The results of the KS test were significant, $p = .008$, which suggests that there was a difference in the volume distributions for speeches compared to testimonies. However, there were ties in the KS test, and thus the AD test was also conducted. The results for the AD, test adjusting for ties, were also significant, $p = .004$. There was a bimodal distribution for the volume for speeches and testimonies. The speeches tended to peak higher in the first peak, and lower for the second peak. The testimonies tended to peak lower for the first peak, and higher for the second peak.

Due to the fact that these findings regarding trading volume do not coincide with the findings of the tests conducted on the other volatility measures, additional KS and AD tests were done using volume data from 1962 to 1996. The results of the KS test were significant, $p < .001$, suggesting that there were differences in the volume distributions when a speech was given and when a testimony was given. However, there were ties in the KS test and thus the AD test was conducted also. The results of the AD test were also significant, $p < .001$. This confirms the findings of the trading volume data from 1996-2012 and suggests that those findings were not an aberration.

3. Equity markets react more to House testimony than Senate testimony.

Kolmogorov Smirnov and Anderson Darling tests were conducted comparing the distributions of trading volume for testimony before the House and Senate. The results of the KS tests were not significant, $p = .739$, which suggests there was no difference in the distribution of volume for the House and the Senate. However, there were ties in the KS test, and thus an AD test was also conducted. The results for the AD test, adjusting for ties, was also not significant, $p = .520$. Therefore, the distributions of trading volume were not different for testimony in each chamber, this suggests that the statements made before the House and Senate carry equal weight in the markets.

4. Equity markets react more to press releases than any other type of communication.

To assess the final question, a Kolmogorov Smirnov test was conducted to compare the press releases and minutes releases on their volume distributions. Press releases and minutes releases were not significantly different, $p = .143$, suggesting no difference in the distribution of trading volume between press releases and minutes releases. An Anderson Darling test was also conducted to compare the trading volume distributions of press releases and minutes releases and they were not significantly different, $p = .082$, suggesting no difference in the distribution of trading volume between the press releases and minutes releases. Essentially, minutes have higher peaks, but press releases have a fatter tail suggesting they have a more sustained impact on markets while minutes occasionally have a slightly more significant impact (Appendix 6) ¹⁴⁶

Additional Kolmogorov Smirnov and Anderson Darling tests were also conducted to assess if there were differences between the distributions of the volume for press releases,

¹⁴⁶ See Figure 1 in Appendix 7.

minutes releases, speeches and testimonies. Four total pairs of distributions were compiled.

Because there were four tests conducted, the level of significance was set to .013 (.050/4).

The first KS test compared the distribution for press releases and speeches; the result was significant, $p = .004$. The second KS test compared the distribution of press releases to testimonies; this KS test was also significant, $p = .002$. The third KS test compared the minutes releases with speeches and the results were not significant, $p = .019$. The fourth KS test compared the minutes releases with testimonies and was also not significant, $p = .057$.

The results of the first AD test compared the distribution for press releases and speeches; the result was significant, $p < .001$. The second AD test compared the distribution of press releases to testimonies and the result was also significant, $p = .003$. The third AD test compared the minutes releases with speeches and the results were significant, $p = .013$. The fourth AD test compared the minutes releases with testimonies and was still not significant, $p = .082$.

Table 10: Summary of Results of Difference in Distributions for Volume

| Distribution 1 | Distribution 2 | KS p -value | AD p -value |
|----------------------------|----------------------|---------------|---------------|
| Chairman | Members | .708 | .527 |
| Chairman (pre 1996) | Members (pre 1996) | .001* | .001* |
| Speeches | Testimony | .008* | .004* |
| Speeches (pre 1996) | Testimony (pre 1996) | .001* | .001* |
| House Testimony | Senate Testimony | .739 | .520 |
| Press Release | Minutes Release | .143 | .802 |
| Press Release | Speeches | .004* | .001* |
| Press Release | Testimony | .002* | .003* |
| Minutes Release | Speeches | .019 | .013* |
| Minutes Release | Testimony | .057 | .082 |

Given the results of these eight tests, trading volume for press releases was significantly different from speeches and testimonies and minutes releases were significantly different from speeches (Appendix 6).¹⁴⁷

5. Discussion

As the table 8 indicates, trading volume is a much more sensitive measure of equity market volatility than market high-to-low and open-to-close; the spread and return measures take into account a great deal of market data beyond simply the number of trades made. When these three variables are taken in concert, they can provide a relatively complete picture of equity market volatility. In the case of this data, every instance of statistically significant findings in the less sensitive volatility measures was confirmed by significant findings in the volume data as well. While the volume data also found several others significant, that does not substantively conflict when evaluating the hypotheses.

¹⁴⁷ See Figure 2 in Appendix 7.

Table 11: Combined Volatility (High-to-Low and Open-to-Close) and Volume

| Distribution 1 | Distribution 2 | Volatility KS <i>p-value</i> | Volatility AD <i>p-value</i> | Volume KS <i>p-value</i> | Volume AD <i>p-value</i> |
|----------------------------------|-------------------------|---------------------------------|---------------------------------|-----------------------------|-----------------------------|
| Chairman | Members | | | .708 | .527 |
| Chairman (log-return) | Members (log-return) | .247 | .167 | | |
| Chairman (log-spread) | Members (log-spread) | .874 | .535 | | |
| Chairman (pre 1996) | Members (pre 1996) | | | .001* | .001* |
| Speeches | Testimony | .065 | .086 | .008* | .004* |
| Speeches (pre 1996) | Testimony (pre 1996) | | | .001* | .001* |
| House Testimony | Senate Testimony | .860 | .558 | .739 | .520 |
| Press Release | Minutes Release | .627 | .271 | .143 | .802 |
| Press Release | Speeches | .100 | .070 | .004* | .001* |
| Press Release | Testimony | .853 | .403 | .002* | .003* |
| Minutes Release | Speeches | .859 | .400 | .019 | .013* |
| Minutes Release | Testimony | .630 | .526 | .057 | .082 |

In addressing the first hypothesis, the spread, return and volume measures all indicated that communications by the Chairman did not influence markets more than communications by other Board members, thereby rejecting the hypothesis. However, the 1962-1996 data differed dramatically from all measures of the 1996-2012 data and supported the hypothesis that communication by the Chairman influenced markets more dramatically. This indicates that prior to undertaking the modern transparency measures that began in the mid-1990s, communications by the Chairman created elevated market volatility in a way that communications by other Board members did not. There are two possible explanations for this: first, as the Fed has become more transparent, it has become apparent to Fed watchers that the Chairman is a “consensus builder,”

not a “dictator.”¹⁴⁸ This realization elevates the role of other Board members and in relation, diminishes the role of the Chairman. Or, second, the increased chatter coming from a variety of new transparency measures has weakened the value of each communication, including those by the Chairman. These two explanations are not mutually exclusive and it is most likely that both are true to some degree.

The data weakly supports hypothesis two by suggesting that speeches do move markets more than Congressional testimony. Although not statistically significant, the spread and return values are nearly significant and volume data from both 1996-2012 and 1962-1996 are statistically significant. In particular, these distributions suggest that speeches typically elicit a more volatile market response, but the second mode suggests that sometimes testimony elicits a more extreme response. Substantively, this means that the equity markets are more likely to respond to a typical speech, but if something extraordinary happens in Congressional testimony, it could drive a market response beyond that seen in less relevant speeches. Since most speeches by Fed Board members are directly related to monetary policy, but much Congressional testimony is focused on regulatory issues,¹⁴⁹ this distribution makes perfect sense. Only when a Board member discusses a regulatory issue of great importance to the market or discusses monetary policy directly does the market respond to testimony. Generally, this suggests that although Congressional testimony may satisfy the oversight needs of members of Congress, the market does not put much stock in the vast majority of this testimony.

¹⁴⁸ Knott discusses these terms at length in an attempt to clarify the role of the Chairman, before the era of elevated Fed transparency.

¹⁴⁹ This is due to the legislative language of the 1978 Humphrey-Hawkins Act which created the basis for regular Fed Board member testimony before Congress primarily to allow for questioning on regulatory issues.

The findings weakly in support of the second hypothesis suggests that even if the third hypothesis is confirmed, House testimony will still generally have less impact on the markets than speeches given by Board members away from the U.S. Capitol. The findings reject the third hypothesis and suggest that testimony before the chambers carry roughly equal weight with regard to market response. This means that either the theory dictating that the Senate should hold more sway over Fed personnel or the anecdotal evidence that suggests that Fed personnel feel more pressure from the House are both incorrect, or they are both correct and therefore offset each other. The initial hypothesis had been developed based on the idea that even if these possibilities offset, the fact that House committees tend to push Fed testimony toward monetary policy more readily would cause markets to pay closer attention and react more severely. The evidence presented here suggests that standard principal-agent theory about Senate oversight and anecdotal evidence of House power are irrelevant when it comes to equity market responses.

Hypothesis four is weakly rejected; speeches have the most dramatic impact on market response, although this response is not very dramatic.¹⁵⁰ The distributions are particularly interesting because speeches definitely create a spike in volume, but they do not elicit a significant differential response in spread or return. The descriptive data presented in table 4 strongly indicates that press releases have the greatest impact on markets, but the logged data adjusting for lack of normality does not confirm this. Nevertheless, the volume data does indicate that press releases have the most consistent impact on market volatility, even if speeches create the highest spike in volatility as a result of certain occasions. Press releases were assumed to have the largest impact on volatility because they are typically policy statements while the other communications are not necessarily. Given that the data does not demonstrate that this policy

¹⁵⁰ This is confirmed by the research of Meyer and Bomfim.

oriented material has a dramatic impact, it indicates that either the policies announced do not impact markets or the markets have already priced in these policy changes. Since Bernanke and Kuttner demonstrated that monetary policy does impact equity markets, this suggests that the markets have priced in policy changes ahead of time, likely in response to previous Fed communications.

Given that equity markets typically do not react to any form of communication but occasionally react severely to outlier communications, it appears that the market perceives most Fed communication to be cheap talk with a few credible (or important) signals interspersed. The 1962-1996 data confirms this assertion by indicating that increased Fed communication has increased noise, potentially hiding instances of credible signals. Congressional testimony by Fed Board members epitomizes this assertion; Board members make general statements and respond to questions with indecipherable jargon and empty platitudes to convey minimal information. These hearings seem to serve more as a performance art than genuine Congressional oversight or Fed transparency, and the data suggests that the markets know that. But, like other forms of communication, these hearings do provide *some* information, even if it is typically disregarded by markets.

Even if the Fed does not dramatically move equity markets with most individual communications, this does not mean the Fed is failing to signal. If anything, this data suggests that although markets seem to key on individual communications, the Fed is signaling with a confluence of all their communications and the occasional outlier that provides a more direct signal. It is possible that the lack of significant market reaction is the Fed's ultimate goal. If they do not visibly impact markets it is easier for the Fed to avoid scrutiny by their principals and therefore retain their autonomy. Essentially, flooding the market with communications to ensure

limited market movement based on individual communications is a way for the Fed to protect their autonomy with transparency. This strategy to preserve autonomy also serves the purpose of managing economic expectations by market actors; for this strategy to work, most (perhaps all) Fed communications contain a modicum of information and Section 6 examines the signaling value of this information when all observations examined in concert.

6. An Alternative Method of Analyzing Fed Communication

Given that the Fed has flooded the market with communications since the mid-1990s, it is essential to examine the period before these transparency measures. The volume findings about equity market volatility from 1962-1996 in response to communication by the Chairman, as opposed to other Board members, directly demonstrate that increasing transparency has implications for how the market interprets Fed communication. This evolution in market response coupled with questions about cheap talk leads one to question the value of ever-increasing Fed transparency. Simply, does the market gain information from the constant flow of chatter coming from the Fed? Or is all of the valuable market moving information found in the outlier communications that many Fed watchers obsess over?

The data presented here suggest that market actors find minimal useful information in the majority of Fed communications, but this does not necessarily mean that these communications are purely cheap talk with valuable insight only coming in error. Figure 1 demonstrates that these Fed-speak communications deliberately provide only minimal information to manage market expectations about Fed policy. In essence, the goal is for no individual communicate to warrant a market reaction, but for the each communication to be part of a larger trail of breadcrumbs for investors to follow so that they are generally not surprised by changes in policy. This

compilation of communications demonstrates a weakness in modern investor strategy. While other forms of investment information have become increasingly quantitative in recent years, Fed watching remains a largely qualitative endeavor; investors treat each of the Fed's communications as discrete events. When these events are taken in concert and systematically analyzed, they can actually be very telling about future Fed policy.

Utilizing the simplest and least substantive form of modern Fed communication, 140 character Tweets, one can actually glean great deal of information about upcoming Fed policy moves. As figure 1 demonstrates, simple word searches for "Large Scale Asset Purchase" and "Stimulus" in publicly released Fed information demonstrate that Fed chatter increases prior to stimulative market intervention. For instance, on October 18, 2010 the Atlanta Fed tweeted "Lockhart is sympathetic to more monetary stimulus but will factor in FOMC deliberations before arriving at a final view <http://ht.ly/2ViUc>." A week before the November 3, 2010 announcement of QE2, on October 27, 2010 the Atlanta Fed also pointed to research in favor of additional asset purchases, "The federal stimulus has fallen from the headlines, but its effects continue. SouthPoint looks at its regional effects <http://ht.ly/30ryK>." Taken in concert with one another, and in the context of a baseline amount of twitter chatter about stimulus, these statements demonstrate that it is not just the outlier communications that matter, but that all (or nearly all) Fed communications contain market relevant information.

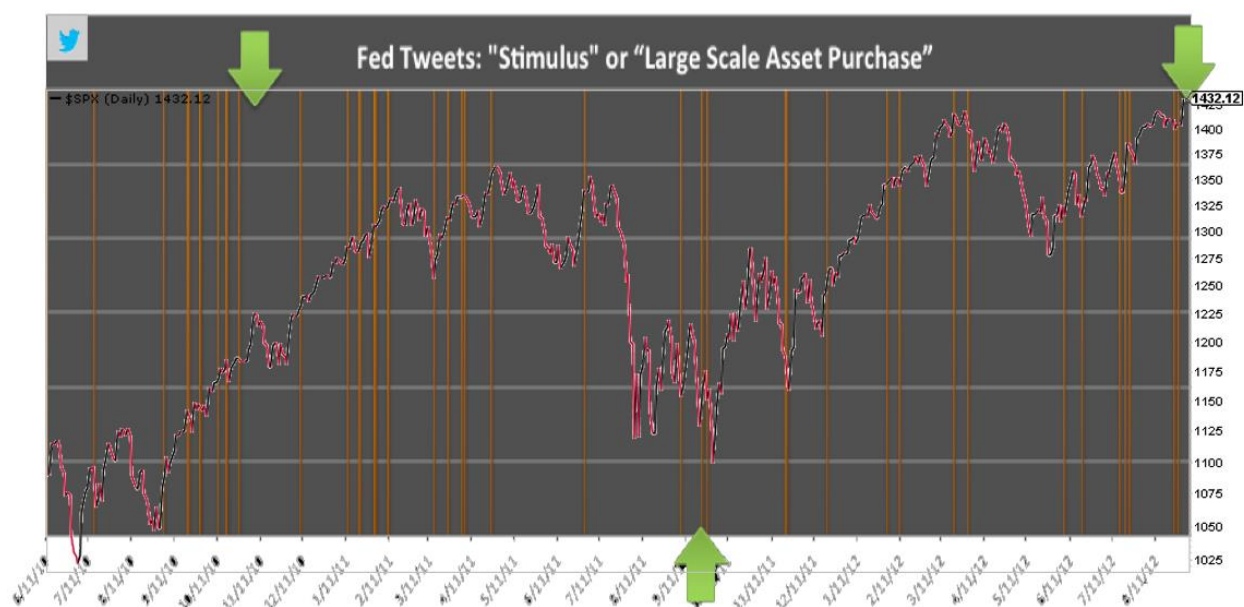


Figure 5: Frequency of Stimulus Language in Fed Tweets

Figure 1 provides a concrete example of Fed signaling through the simplest communication mechanism in 2011. The figure illustrates that unlike the run-up to the second round of asset purchases (QE2), and despite enormous market expectations that the Fed would engage in a third round of quantitative easing prior to the September 2011 FOMC meeting, Fed stimulus chatter was relatively subdued. Though the data does indicate a slight rise in stimulus chatter over this period, it was nothing like the chatter preceding QE2. If anything, a close look at the statements indicated the Fed was heading toward “Operation Twist” by early summer. On June 30, 2011 the St. Louis Fed tweeted “Bullard: Asset purchases at longer maturities can substitute for ordinary monetary policy <http://bit.ly/ioqQrF>.” This maturity extension is the essence of the Twist plan that was unveiled at the September 2011 FOMC meeting.

Additionally, figure 1 illustrates that after June of 2012, stimulus chatter increased rapidly. This chatter culminated in the announcement of a third round of large scale asset

purchases (QE3) on September 13. The announcement of QE3 and its predecessor, Twist, demonstrates that when quantitatively analyzed, the Fed's seemingly insignificant chatter can help identify upcoming policy changes that are likely to elicit a market response.

This examination of the Fed's simplest form of communication demonstrates that although equity markets rarely react to average Fed communications, market actors would benefit from systematically reacting to the constant flow of data presented in these communications. As the S&P data in figure 1 makes clear, equity markets significantly responded to changes in Fed policy in 2010-2012, so it would behoove the Fed watcher who used to only react to the Chairman's few communications to utilize all that the Fed's modern transparency measures by systematically analyzing that chatter instead of cherry-picking key statements and hoping they are the ones that will move markets.

7. Conclusion

The modern financial news media constantly monitors and critiques communications by the Federal Reserve with the implication that each communication will influence equity markets. The analysis provided here demonstrates that this assumption is flawed; most Fed communications elicit only a minimal market response with a few outliers drawing greater reaction, thereby allowing media outlets to confirm their prior belief that Fed communications move markets. Despite the generally null finding that average Fed communications do not significantly move markets, this paper demonstrates that when treated as a body of data taken in concert, Fed communications do provide a map to Fed policy. This map has the potential to change Fed watching from a qualitative or speculative endeavor focused on outlier

communications to a systematic analysis of the breadcrumbs Fed personnel have been leaving for market actors to follow.

The analysis conducted here specifically indicates that on average Congressional testimony, press releases and minutes releases create relatively measured market responses while some speeches do cause a noted increase in equity market volatility. This analysis also indicates that in the era preceding modern Fed transparency, communications from the Chairman created a more significant market reaction than communications made by his colleagues on the Board. This suggests that increased transparency has increased chatter about Fed policy among market actors. The result has been to discount most Fed communications and treat them largely as cheap talk, only keying on certain words or phrases that hint at upcoming policy changes. This means that market actors may respond dramatically to the occasional Fed communication, thereby lending credence to the media assertion that the Fed moves markets, but even dramatic movements are preceded by signals best examined systematically with automated content analysis. Essentially, Fed watchers in the habit of qualitatively selecting information from various Fed communications might benefit from a more comprehensive and systematic analysis, modern automated content analysis tools make this possible.

Given that these findings oppose what the financial news media espouses as conventional wisdom about the massive market response to Fed communications, it is fair to question if volatility was under-measured by the particular metrics used. However, even when utilizing a daily moving average of volatility, like the VIX, to examine the impact of Fed policy “surprises,” the data has indicated that Fed policies move markets less than expected.¹⁵¹ To some extent, this

¹⁵¹ Topol draws on the Surprise Index created by Goukasian and Whitney to examine this issue from 1987-2012 and finds an insignificant negative correlation with Fed surprises and volatility. Essentially, he finds that if anything, when the Fed surprises the market it becomes more stable, not more volatile.

is a function of the forward-looking nature of the VIX and the fact that a Fed surprise should prompt future instability to decline as policy certainty increases, but this only highlights the limitations of these more comprehensive volatility measures when examining Fed policy. The more important outcome from the findings presented here is to suggest that given the evolution of Fed transparency, individual Fed communications are not and should not be used as cues about market behavior. Instead, these Fed communications should be taken in concert and utilized as a collective index that provides quantitative data about the direction of Fed policy and how it will impact markets.

In addition to providing information to market actors, the Fed has utilized self-imposed transparency to maintain its independence. Since studies suggest that independent central banks create superior policy outcomes, (Keefer and Stasavage, 2003) ¹⁵² this logically leads to the conclusion that by flooding the market with communication noise the Fed has created better monetary policy; future studies should test this assumption. Content analysis of speeches, testimony, press releases, minutes releases, other announcements (Appendix 7) ¹⁵³ and even tweets could yield enormous insight toward the role of these communications and the efficacy of Fed policy. Moreover, systematic analysis of these communications could provide a great deal of general information about how bureaucracies utilize communication to their advantage. Finally, a quantitative analysis of these communications could also provide lucrative insights to the upcoming changes in Fed policy and how these policy moves will impact markets.

¹⁵² Keefer, Phil and David Stasavage. "The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy." *American Political Science Review*. 97: pp. 407-423. (2003).

¹⁵³ These are examined in some detail in Appendix 8.

Appendix 1: Fed Policy and Reform Timeline

Internal Reforms are underlined AND *External Reforms* are italicized

1910s and 1920s (The Fed's Pluralist Founding)

- Regions Peg to NY Fed Rates

1930s and 1940s (The Ineffectual Fed)

- 1933 *The Securities Act charges Fed With New Regulatory Duties*
- 1933 *Glass-Steagall Creates FDIC and Clarifies Fed as Systemic Lender of Last Resort, Not Individual LOLR*
- 1934 *Securities and Exchange Act Creates SEC and Clarifies Regulations on Investment and Commercial Banks*
- 1935 *Banking Act Creates FOMC and 7-member Board No Longer Includes Treasury Secretary or Comptroller of Currency*
- 1946 *Employment Act Declares Fed and Treasury Policy Must Consider "Employment, Production, Purchasing Power and Price Levels"*
- 1948 *Senator Paul Douglas (former economics professor) elected in part on a platform of Fed reform*
- 1949 *Congressional Hearings about Interest Rate Policy To Pressure Treasury to Free Fed*

1950s and 1960s (The Era of Centralization)

- 1951 Fed-Treasury Accord Signed and Affords Fed Some Additional Autonomy Over Monetary Policy
- 1951 William Martin Appointed Fed Chairman, Leaving His Post in Treasury
- 1964 Green Book "Current Economic and Financial Conditions" is Created
- 1965 Blue Book "Monetary Policy Alternatives" is Created

1970s (Inflation and Retrenchment)

- 1971 *Economic Stabilization Act Attempts Wage and Price Controls to Constrain Inflation*
- 1977 *Fed Reform Act Establishes Senate Confirmation of Chair and Vice Chair as well as Initiating Quarterly Fed Reports to Congress*
- 1978 *Humphrey-Hawkins Dictates that Fed Make Monetary Policy that maximizes growth, minimizes inflation and promotes price stability*

1980s (The Era of Technocracy)

- 1979 Target Quantity of Money to Control Inflationary Pressure
- 1980 Depository Institutions Deregulation and Monetary Control Act (DIDMCA) Begins Lower Leverage Limits and Allows Fed to Regulate Less
- 1983 Beige Book "Summary of Commentary on Current Economic Conditions by Federal Reserve District" is Created

1990s and 2000s (Technocracy Creates the Need for Transparency)

- March 1993 Release of FOMC Meeting Minutes (6-8 week lag)
- November 1993 Release of FOMC Meeting Transcripts (5 year lag)
- 1994 Qualitative Announcement of Rate Changes and Rationale
- 1996 Quantitative Announcement of Rate Change and Rationale
- 1999 Press Release of Quantitative Rate Policy After Each FOMC Meeting Even When Rates Are Unchanged
- 2000 Announcements of Likely Future Rate Action Given Economic Outlook
- 2002 Release of Individual FOMC Votes and Policy Preferences of Dissenters
- 2009/2010 Quantitative Easing and Other Crisis Actions to Grow Fed Balance Sheet
- 2010 Dodd-Frank Creates Vice Chair for Supervision inside Fed, Permits GAO Audit of Fed, and Creates Consumer Financial Protection Bureau Inside Fed
- 2011 Chairman Holds Press Conferences After FOMC Meetings
- 2012 Fed Announces Inflation Target as a Transparency Measure

Appendix 2: Treasury Bond Market Volatility, Chairman Versus Other Members

Table A2A: Treasury Market Volatility When Chairman Communicates

| | 3 Month | 6 Month | 1 Year | 2 Year | 3 Year | 5 Year | 7 Year | 10 Year | 20 Year |
|-----------------|------------|------------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| Overall | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Speeches | 0.03 | 0.02 | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| House | 0.03 | 0.03 | 0.04 | 0.05 | 0.06 | 0.06 | 0.07 | 0.06 | 0.06 |
| Senate | 0.02 | 0.02 | 0.03 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Average | 0.03 | 0.02 | 0.03 | 0.05 | 0.05 | 0.05 | 0.06 | 0.05 | 0.05 |

Table A2B: Treasury Market Volatility When Non-Chair Board Member Communicates

| | 3 Month | 6 Month | 1 Year | 2 Year | 3 Year | 5 Year | 7 Year | 10 Year | 20 Year |
|-----------------|------------|------------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| Overall | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| Speeches | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.06 | 0.06 | 0.05 | 0.05 |
| House | 0.03 | 0.02 | 0.03 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Senate | 0.02 | 0.02 | 0.03 | 0.05 | 0.06 | 0.06 | 0.07 | 0.07 | 0.06 |
| Average | 0.03 | 0.02 | 0.03 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.05 |

Appendix 3: Transforming Open to Close Data

Absolute open-to-close log-return is a positive semi-definite transformation of a skewed, fat-tailed variable. As a result, the distribution is non-negative and asymmetric. The histogram below in figure A3A confirms this assumption, and a Shapiro-Wilk test rejects the normality null with p-value approximately 0.

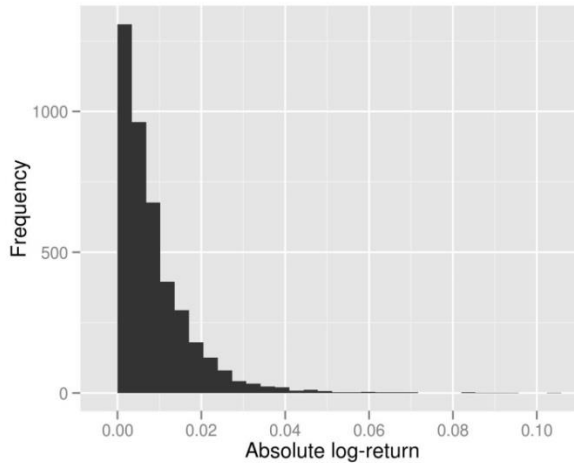


Figure A3A: *Histogram of Absolute Log Return*

Given that this data is non-negative and right-skewed, a log-transform was also utilized to normalize the absolute open-to-close log-return. However, as shown in figure A3B below, this distribution is strongly left-skewed and asymmetric. A Shapiro-Wilk test also rejects the normality null with a p-value numerically equal to 0 after removing return values equal to zero.

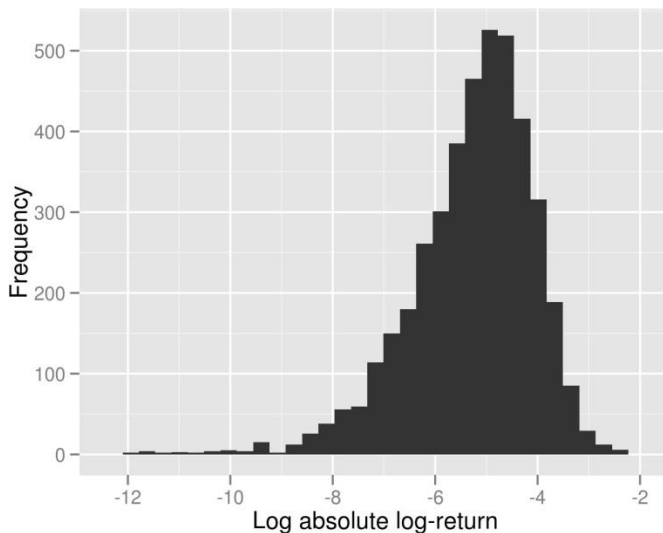


Figure A3B: *Histogram of Log Absolute Log Return*

Based on the violation of normality for the dependent variable, transformed and untransformed, linear regression was deemed unusable for the open to close data.

Appendix 4: Transforming High to Low Data

High-to-low log spread is a difference between a process max and a process min; given that risky asset processes, by definition, have an integral of their squared derivative greater than 0, this spread is a strictly positive variable. As the histogram below in figure A4A shows, the spread variable itself is highly non-normal, exhibiting significant right-skew and kurtosis. A Shapiro-Wilk test rejects the normality null with a p-value numerically equal to 0.

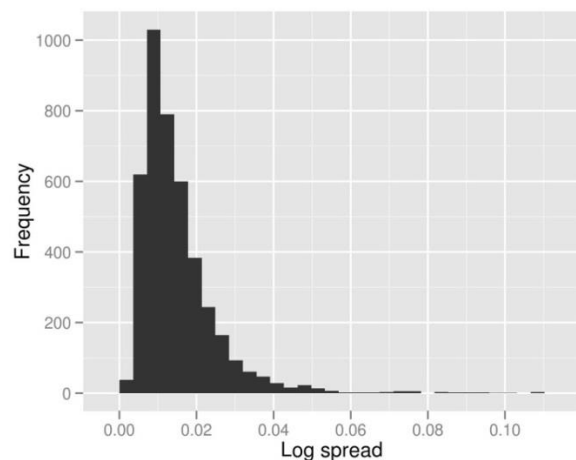


Figure A4A: Histogram of High to Low Log Spread.

A log-transformation of this spread variable yields the distribution shown below in figure A4B. Inter-ocular examination dictates that this distribution is the closest to normal thus far, exhibiting relative symmetry and an excess kurtosis of 0.2. However, the large number of right-skewed outliers causes both Shapiro-Wilk and Jarque-Bera tests to reject the normality of this distribution with p less than one-millionth.

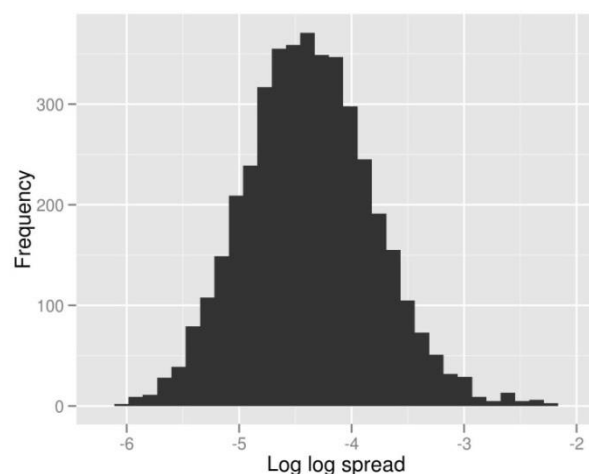


Figure A4B: Histogram of Log High to Low Log Spread.

Despite being closer to normal on some metrics than the open to close data, the spread variable still violates normality requirements, even when log-transformed.

Appendix 5: Volatility Plots Demonstrating Non-normality of Data

Plots of dollar volume and trailing volatility measures exhibit clear dependence on time, auto-regressivity, and heteroskedasticity. Therefore, they are not suitable for regression given in this framework.

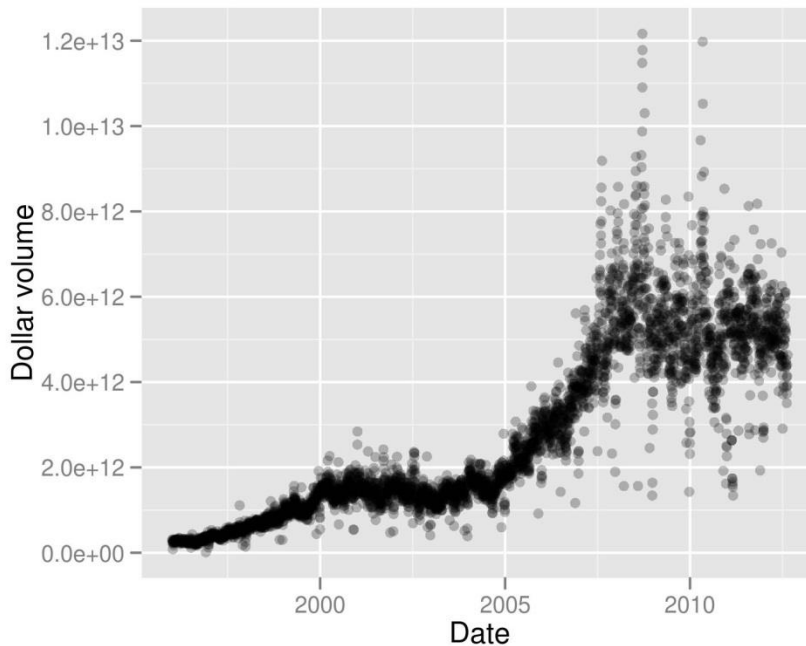


Figure A5A: Time series plot of dollar volume estimate

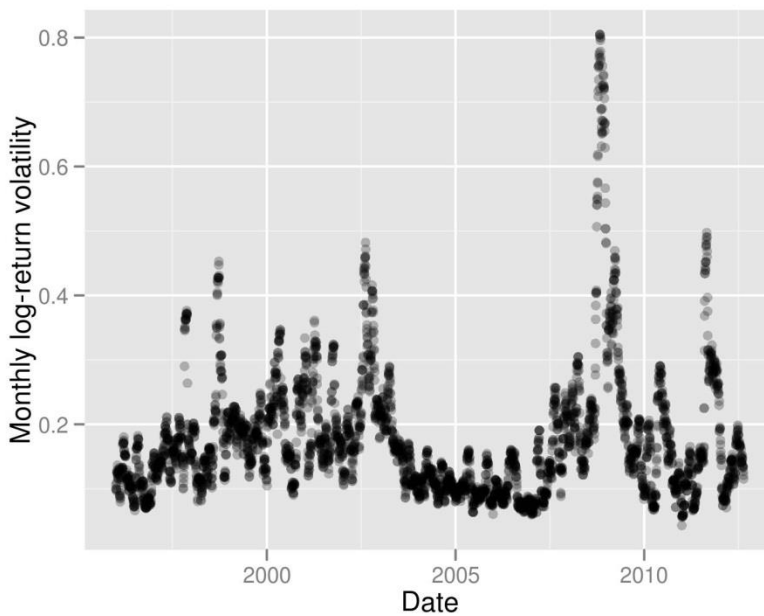


Figure A5B: Time series plot of trailing monthly log-return standard deviation

Appendix 6: Spread and Return Volatility Distributions

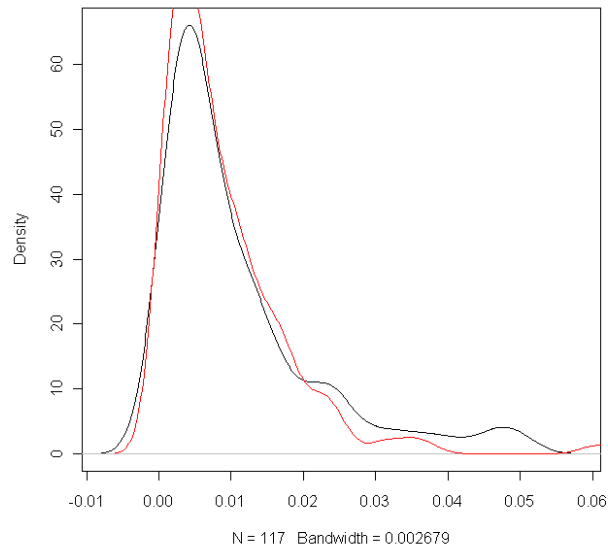


Figure A6A: Volatility distributions, log-return Press Releases (black) and Minutes Releases (red)

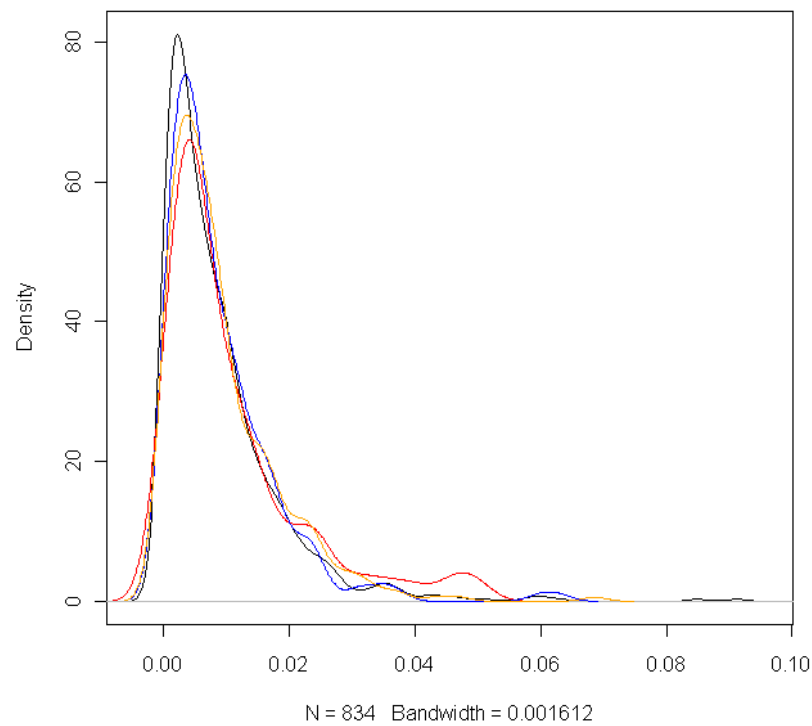


Figure A6B: Volatility distributions, log-return Speeches (black), Press Releases (red), Minutes Releases (blue) and Testimonies (orange)

Appendix 7: Volume Volatility Measures

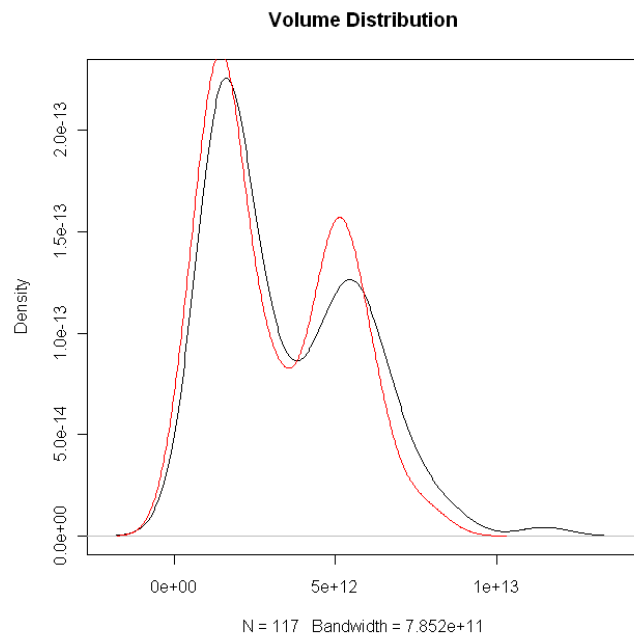


Figure A7A: Volatility distributions of Press Releases (black) and Minutes Releases (red)

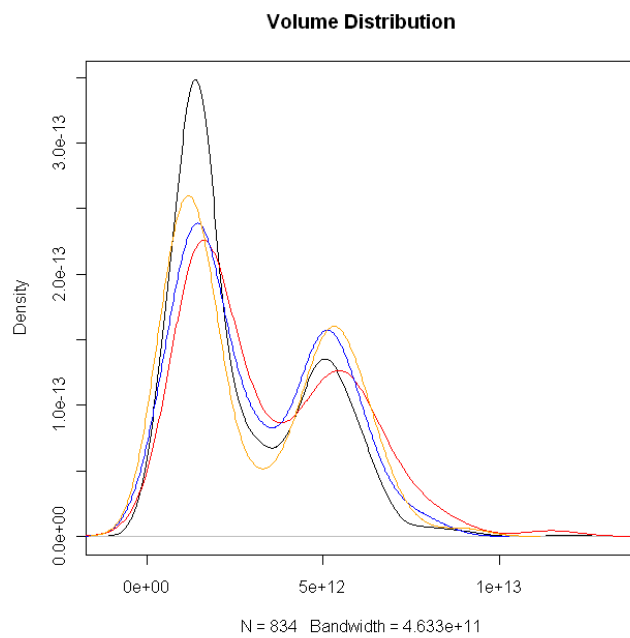


Figure A7B: Volatility distributions of Speeches (black), Press Releases (red), Minutes Releases (blue) and Testimony (orange)

Appendix 8: Examination of “Other Announcements” by the Federal Reserve Board

These announcements involve a mix of monetary and regulatory actions. They are a relatively new communication mechanism only used 29 times before June of 2007. Between June of 2007 and June of 2012 they were used 203 times, but given the excessive market volatility due to the financial crisis and the low number of observations about monetary policy these were not a reliable indication of market response. Nevertheless, they do represent a new method of Fed communication that appears to move markets.

Table A8A: Average Volatility of Other Announcements 1996-2012 (232 Observations)

| | Spread | Return | Volume | Average % Change (Abs Value) |
|----------------------------|--------|--------|------------|---------------------------------|
| Overall | 17.10 | 10.00 | 2331411333 | |
| Other Announcements | 24.31 | 15.64 | 4628657712 | 65.71% |

As Table A3 indicates these announcements move markets, but since volatility has generally risen over the sample period and the vast majority of these observations (203 of the 232) occur in the final third of the sample, this data overstates the relative level of volatility increased by “Other Announcements.”

Table A8B: Average Volatility of Other Announcements June 2007-June 2012 (203 Observations)

| | Spread | Return | Volume | Average % Change (Abs Value) |
|----------------------------|--------|--------|------------|---------------------------------|
| Overall | 20.42 | 12.01 | 4571870006 | |
| Other Announcements | 25.19 | 16.11 | 5074793247 | 22.81% |

Table A4 provides a more accurate representation of the extent to which “Other Announcements” move markets. This data indicates that these announcements have an impact second only to Press Releases, which typically announce policy changes. This makes sense since these “Other Announcements” were repeatedly used to announce emergency policy actions in period between 2007-2012, particularly in 2008 and 2009. As emergency measures have become less necessary, these announcements continued to be used to provide other policy information that moves markets. Future study will necessarily need to include an examination of these communications as the sample size grows.

Bibliography

Press Release: Economists' National Committee On Monetary Policy, "51 Members Urge the Importance of Restoring and Maintaining the Independence of the Federal Reserve System." Last modified Feb 28, 1951. Accessed July 20, 2013.

http://fraser.stlouisfed.org/docs/historical/eccles/062_09_0003.pdf.

The Federal Reserve Bank of Minneapolis, "A History of Central Banking in the United States." Accessed July 20, 2013.

http://www.minneapolisfed.org/community_education/student/centralbankhistory/bank.cfm.

Axilrod , Stephen. "Inside the Fed." *MIT Press*, 2011.

Axilrod, Stephen. Telephone Interview. 23 November 2011.

Bensel, Richard. *Yankee Leviathan: The Origins of State Authority in America*. Cambridge: Cambridge University Press, 1990.

Bernanke, Ben. *Essays on the Great Depression*. Princeton: Princeton University Press, 2000.

Bernanke, Ben. "Federal Reserve Communications." Last modified Nov 14, 2007. Accessed July 20, 2013. <http://www.federalreserve.gov/newsevents/speech/bernanke20071114a.htm>.

Bernanke, Ben and Kenneth Kuttner . Federal Reserve Board, "What Explains the Stock Market's Reaction to Federal Reserve Policy?." Last modified March 2004. Accessed July 20, 2013. < <http://www.federalreserve.gov/pubs/feds/2004/200416/200416pap.pdf>.

Bernhard, William. "A Political Explanation of Variations in Central Bank Independence." *American Political Science Review*. no. 92 (1998).

Binder, Sarah , Spindel, Mark. "Monetary Politics: Origins of the Federal Reserve." *Studies in American Political Development*. (2013): 1-13.

Board of Governors of the Federal Reserve System. *Annual Report Covering Operations for Year 1947*. Washington D.C.: Federal Reserve, 1947.

Board of Governors of the Federal Reserve System, *Supplement to Banking and Monetary Statistics*, Section 9. Washington, D.C. government Printing Office, 1965.

Board of Governors of the Federal Reserve System , "Minutes of the Federal Open Market Committee, Washington, Unpublished." Accessed July 20, 2013.

<http://www.federalreserve.gov/monetarypolicy/files/fomcropa19470605.pdf>.

Bremner, Rober P., *Chairman of the Fed: William McChesney Martin Jr. and the Creation of the Modern American Financial System*. New Haven: Yale University Press, 2004.

Brady, David W. and Volden, Craig. *Revolving Gridlock: Politics and Policy From Jimmy Carter to George W. Bush.* New York: Westview Press, 2006.

Bruner, Robert and Sean Carr. *The Panic of 1907: Lessons Learned from the Market's Perfect Storm.* Hoboken, New Jersey: John Wiley and Sons, 2007.

Burns, Arthur F. The Anguish of Central Banking. The 1979 Per Jacobson Lecture.
<<http://www.perjacobsson.org/lectures/1979.pdf>>

Carpenter, Daniel. *The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862-1928.* Princeton: Princeton University Press: 2001.

Chappell, Henry W., Rob Roy McGregor and Todd Vermilyea. *Committee Decisions on Monetary Policy.* The MIT Press: 2005.

Clarke, Wes. "Divided Government and Budget Conflict in the U. S. States." *Legislative Studies Quarterly*. no. 1 (1998): pp. 5-22.

Committee on the History of the Federal Reserve System. "Profile of the Federal Reserve System Top Command." FRASER Electronic Archives: Federal Reserve Bank of St. Louis, 1955.

Copelovitch, Mark S. and David A. Singer. 2008. "Financial Regulation, Monetary Policy, and Inflation in the Industrialized World." *Journal of Politics* no. 70: (2008): pp. 663-680.

Council of Economic Advisers. The Economic Report of the President. , Last modified Feb 14, 1953. Accessed July 20, 2013.
http://fraser.stlouisfed.org/docs/publications/ERP/1953/ERP_1953.pdf.

Cross, Gary and Jan Paschal. "Timeline: Federal Reserve's Transparency Steps." Reuters. 25 January 2012. <http://www.reuters.com/article/2012/01/25/us-usa-fed-communications-idUSTRE8002QQ20120125>

Curran, John J. and Jesse Hamilton. Schapiro SEC Seen Ineffectual Amid Dodd-Frank Funding Curbs. 31 March 2011. <http://www.bloomberg.com/news/2011-03-31/schapiro-sec-seen-ineffectual-amid-dodd-frank-funding-curbs.html>

Dillon, Douglas. *Memorandum for the President McChesney Martin Collection.* Missouri Historical Society, 1964.

Dr. Econ. Educational Resources: Federal Reserve Bank of San Francisco. May 2001.
<http://www.frbsf.org/education/activities/drecon/2001/0105.html>

Dixit, Avinash, and Jensen Henrik . "Common Agency with Rational Expectations: Theory and Application to a Monetary Union." *The Economic Journal* . no. 489 (2003): pp. 539-549.

Eccles, Marriner. *Beckoning Frontiers: Public and Personal Recollections*. New York: Alfred A. Knopf, 1951.

Eccles, Marriner. "Notes from Meeting between President of the United States and FOMC." Last modified Jan 31, 1951. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/062_01_0001.pdf.

"Economists, The. Board of Governors of the Federal Reserve System." Last modified June 28, 2013. Accessed July 20, 2013. <http://www.federalreserve.gov/econresdata/theeconomists.htm>.

Eichengreen, Barry, and Peter M. Garber. *Financial Markets and Financial Crises*. N.p.: University of Chicago Press, 1991. pp. 175-206. Web. 27 Apr. 2012.

Epstein, David and Sharyn O'Halloran. *Delegating Powers: A Transaction Cost Politics Approach to Policy Making Under Separate Powers*. Cambridge: Cambridge University Press, 1999.

Farrell, Joseph, and Matthew Rabin. "Cheap Talk." *The Journal of Economic Perspectives*. no. 3 (1996): pp. 103-118.

Federal Open Market Committee, *Meeting Minutes* 4 October 1948. Accessed from FRASER <http://fraser.stlouisfed.org/>.

"Federal Reserve Act. Board of Governors of the Federal Reserve System." Last modified 1913. Accessed July 20, 2013. <http://www.federalreserve.gov/aboutthefed/fract.htm>.

Federal Reserve Bank of New York. "Historical Changes of the Target Federal Funds and Discount Rates." <http://www.newyorkfed.org/markets/statistics/dlyrates/fedrate.html>.

Federal Reserve Board, 1914-1956 and Federal Advisory Council 1914-1956. FRASER Electronic Archives: Federal Reserve Bank of St. Louis.

Federal Reserve Board Economists, 1914-1954. FRASER Electronic Archives: Federal Reserve Bank of St. Louis.

Flaherty, Edward. "A Brief History of Central Banking in the United States." Last modified 2010. Accessed July 20, 2013. <http://odur.let.rug.nl/~usa/E/usbank/bankxx.htm>.

Friedman, Benjamin. "Why the Fed Should Not Adopt Inflation Targeting." *International Finance*. no. 1 (2004): pp. 129–136.

Friedman, , Milton, and Anna Jacobson Schwartz. *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press, 1963.

Gavin, William, and Rachel Mandel. "Inside the Briefcase: The Art of Predicting the Federal Reserve." *The Regional Economist Federal Reserve Bank of St. Louis*, July 2000. <http://www.stlouisfed.org/publications/re/articles/?id=487> (accessed July 20, 2013).

Goodfriend, Marvin. "Central Banking in the Credit turmoil: An Assessment of Federal Reserve Practice." *Monetary Economics* . no. Sep (2010): pp. 1-12. *ScienceDirect*. Web. 27 Apr. 2012.

Goukasian, Levon, and L. Keith Whitney. *Does the Stock Market Under-React to the Federal Reserve Bank's Monetary Policy Actions*. NBER, 2006.

Gramley, Lyle. Telephone Interview. March 2012.

Greider, William. *Secrets of the Temple: How the Federal Reserve Runs the Country*. Touchstone Publishing, 1987.

"Half Measures From the Fed." *The New York Times*, Aug 9, 2011.
http://www.nytimes.com/2011/08/10/opinion/half-measures-from-the-fed.html?_r=2&hp
(accessed July 20, 2013).

Hargrove, Edwin C, Samuel A Morley, and . *The President and the Council of Economic Advisers, Interviews with CEA Chairmen*. Boulder, CO. : Westview Press, 1984.

Havrilesky, Thomas M. *The Pressures on American Monetary Policy*. Springer Publishing, 1995.

Henderson, Nell. "Chairman Moved a Nation." *The Washington Post*, Jan 26, 2006.

Federal Reserve Bank of New York, "Historical Changes of the Target Federal Funds and Discount Rates." Accessed July 20, 2013.
<http://www.newyorkfed.org/markets/statistics/dlyrates/fedrate.html>.

Holmes, Douglas. "Economy of Words." *Cultural Anthropology* . no. 24 (2009): pp. 381–419.

Huber, John, and Charles Shipan. *Deliberate Discretion? The Institutional Foundations of Bureaucratic Autonomy*. Cambridge: Cambridge University Press, 2002.

Joint Committee of the Economic Report, "United States Monetary Policy: Recent Thinking and Experience." Last modified 1994. Accessed July 20, 2013.
http://fraser.stlouisfed.org/docs/historical/jec/1954jec_monetarypol.pdf.

Joint Committee of the Economic Report. "Monetary Policy and the Management of the Public Debt.: Last modified 1952.
http://fraser.stlouisfed.org/docs/publications/mpmpd/1952jc_mpmpd_report.pdf

Keech, William, and Irvin Morris. "Appointments, Presidential Power, and the Federal Reserve." *Journal of Macroeconomics*. no. 2 (1997): pp. 253–267.

Keefer, Phil and David Stasavage. "The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy." *American Political Science Review*. 97: pp. 407-423. (2003).

Kettl, Donald. *Leadership at the Fed*. Yale University Press, 1986

Knipe, James K. . *Office Correspondence: Paper on Public Criticism of the Federal Reserve System* William McChesney Martin Jr. Collection. Missouri Historical Society, 1962.

Knott, Jack. "The Fed Chairman as a Political Executive." *Administration and Society*. 18(2): pp. 197-231. (1986).

Krehbiel, Keith. *Pivotal Politics: A Theory of U.S. Law Making*. Chicago: University of Chicago Press, 1998.

Kriner, Douglas, and Liam Schwartz. "Divided Government and Congressional Investigations." *Legislative Studies Quarterly*. (2008).

Krugman, Paul. *The Return of Depression Economics and the Crisis of 2008*. New York: W.W. Norton, 2009.

Lanston, Aubrey G. Pennsylvania Bankers Association, "'The Treasury-Federal Reserve Dispute.'" Speech at Annual Meeting of Group 2." Last modified Feb 12, 1951. Accessed July 20, 2013.

Law Librarians Society of Washington D.C, "The Federal Reserve Act of 1913-A Legislative History." Accessed July 20, 2013. <http://www.llsdc.org/FRA-LH>.

Lowenstein, Roger. "The Education of Ben Bernanke." *New York Times Magazine*, Jan 20, 2008.

Martin, William McChesney. Governors of the Federal Reserve System, "Annual Report of the Board of Governors of the Federal Reserve System: Covering the Operations of the Year 1952." Last modified May 8, 1953. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/publications/arfr/1950s/arfr_1952.pdf.

Maser, Steven, and Fred Thompson. "The Fox and the Henhouse: On the Wisdom of GAO Audits of the Federal Reserve." *The Economists' Voice*, Oct 2010.

Mayer, Thomas. *The Political Economy of American Monetary Policy*. New York: Cambridge University Press, 1990.

McCabe, Thomas. "Letter to President Truman." Last modified Feb 7, 1951. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/062_04_0002.pdf.

McCabe, Thomas. "Letter to Treasury Secretary Snyder." Last modified Feb 7, 1951. http://fraser.stlouisfed.org/docs/historical/eccles/062_04_0001.pdf

McCubbins, Mathew, Roger Noll, and Barry Weingast. "Administrative Procedures as Instruments of Political Control." *Journal of Law, Economics, and Organization* . no. 2 (1987): pp. 243-277.

Meltzer, Allan H. *A History of the Federal Reserve, vol. 1. 1913-1951*, Chicago: University of Chicago Press, 2003.

Meltzer, Allan H. In: *A History of the Federal Reserve, vol. 2, Book , 1951-1969*, Chicago: University of Chicago Press, 2010.

Meltzer, Allan H., "Politics and the Fed." *Tepper School of Business*. Working paper 582. <http://repository.cmu.edu/tepper/582>

Meulendyke, Anne-Marie *U.S. Monetary Policy and Financial Markets* . New York: Federal Reserve Bank of New York, 1998.

Meyer, Lawrence, and Antulio Bomfim. *Monetary Policy Insights: Fixed Income Focus. Who Moved Markets in 2010?*. Macroeconomic Advisers LLC, March 2011.

Meyer, Lawrence and Antulio Bomfim. "*Monetary Policy Insights: Fixed Income Focus. Who Moved Markets in 2011?*" Macroeconomic Advisers LLC. January 2012.

Meyer, Lawrence. Telephone Interview. May 2012.

Mishkin, Frederic. "Why the Federal Reserve Should Adopt Inflation Targeting." *International Finance*. no. 1 (2004).

Joint Economic Committee Report, "Money, Credit and Fiscal Policies." Last modified 1950. Accessed July 20, 2013. http://fraser.stlouisfed.org/docs/historical/eccles/070_05_0001.pdf.

Morris, Irwin L. *Congress, The President, and The Federal Reserve: The Politics of American Monetary Policy Making*. University of Michigan Press, 2002.

Moss, David and Cole Bolton. The Federal Reserve and the Banking Crisis of 1931. Harvard Business School Case. January 2009.

Moss, David and Cole Bolton. Fighting a Dangerous Financial Fire: The Federal Response to the Crisis of 2007-2009. Harvard Business School Case. March 2010.

Nash, Betty Joyce. "*Federal Reserve: The Changing Face of Monetary Policy*." Region Focus, Third Quarter, 2010.

Office of the Treasury, "Annual Report of the Secretary of the Treasury on the State of the Finances For the Fiscal Year Ended June 30, 1953." Last modified 1953. Accessed July 20, 2013.

Peek Joe, Eric Rosengreen and Geoffrey Tootell (1999) "Does the Federal Reserve Possess an Exploitable Informational Advantage?" Federal Reserve Bank of Boston Working Paper.

Phillips, A. W. . "The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957." *Economica*. no. 100 (1958): pp. 283–299.

"Press Release. Board of Governors of the Federal Reserve System." Last modified Nov 3, 2010. Accessed July 20, 2013. <http://www.federalreserve.gov/newsevents/press/monetary/20101103a.htm>.

Wessel, David. *In Fed We Trust: Ben Bernanke's War on The Great Panic*. New York, Three Rivers Press, 2010.

Schnidman, Evan. Bloomberg News, "Fed Inflation Goal is More Politics than Policy." Last modified Feb 5, 2010. Accessed July 20, 2013. <http://www.bloomberg.com/news/2012-02-06/fed-inflation-goal-is-more-politics-than-policy-evan-schnidman.html>.

Snyder, John to Paul Douglas 31 October 1949. Accessed from *FRASER* <http://fraser.stlouisfed.org/>.

Spence, Michael. "Signaling in Retrospect and the Informational Structure of Markets ." *The American Economic Review*. no. 92 : pp.434-459.

Stein, Jeremy C. "Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements." *The American Economic Review*. No. 79: pp. 32-42.

Stein, Jeremy C. Brookings Institution Speech, "Evaluating Large-Scale Asset Purchases." Last modified Oct 11, 2012. Accessed July 20, 2013. <http://www.federalreserve.gov/newsevents/speech/stein20121011a.htm>.

Stockwell, Eleanor (Editor). "Working at the Board 1930s-1970s." *FRASER Electronic Records: Federal Reserve Bank of St. Louis* (1989).

Swanson, Eric T. "Let's Twist Again: A high-Frequency Event-Study Analysis of Operation Twist and Its Implications for QE2." *Federal Reserve Bank of San Francisco* (2011). Web. 24 Apr. 2012.

Subcommittee on Monetary, Credit, and Fiscal Policies, (1950). Monetary, credit and fiscal policies. Joint Committee on the Economic Report. 81st Congress, 2nd session (November–December). Government Printing Office, Washington.

Swanson, Eric T. "Let's Twist Again: A high-Frequency Event-Study Analysis of Operation Twist and Its Implications for QE2." *Federal Reserve Bank of San Francisco* (2011). Web. 24 Apr. 2012.

Timberlake, Richard. *Monetary Policy In the United States: An Intellectual and Institutional History*. Chicago. University of Chicago Press: 1993.

Toma, Mark. "Interest Rate Controls: The United States in the 1940s." *The Journal of Economic History*. no. 3 (1992): pp. 631-650.

Topol, Graham. "The Role of Bankers in the Federal Reserve System: Input, Interaction, and Influence." Working Paper. April 2012.

Federal Open Market Committee, "Transcripts and Other Historical Materials." Last modified Jan 12, 2012. Accessed July 20, 2013. <

http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm.

Volcker, Paul A. "1984 Cosmos Club Award Remarks." 3 May 1984.

Wells, Donald R. *The Federal Reserve System: A History*. Jefferson: McFarland & Company Inc., 2004.

Wessel, David. *In Fed We Trust*. New York: Three Rivers Press, 2010.

Federal Reserve Bank of New York, "What Do We Do: Federal Open Market Committee." Accessed July 20, 2013. <http://www.newyorkfed.org/aboutthefed/fedpoint/fed48.html>.

Federal Reserve Bank of St. Louis, "What's In Greenspan's Briefcase." Last modified 2000. Accessed July 20, 2013.

White, Lawrence J. *The S&L Debacle: Public Policy Lessons for Bank and Thrift Regulation*. New York: Oxford University Press, 1991.

Wilson, James Q. *Bureaucracy: What Government Agencies Do and Why They Do It*. New York: Basic Books, 1989.

Woolley, John T. *Monetary Politics: The Federal Reserve and the Politics of Monetary Policy*. Cambridge: Cambridge University Press, 1984.

Wicker, Elmus R. "The World War II Policy of Fixing a Pattern of Interest Rate." *The Journal of Finance*. no. 3 (1969): pp. 447-458.